



Condensed Catalog

GENERAL RADIO COMPANY

West Concord, Massachusetts, USA

Oscillators

	Type	Frequency Range	Maximum Output/ Open Circuit Volts	Nominal Load Impedance	Harmonic Distortion	Additional Features
	1305-A Low-Frequency Oscillator \$940	0.01-1000 cycles	167 mw per phase into wye load of 600 Ω per phase; 10v, rms, max. open circuit		<2%	3-phase and 4-phase outputs for phase shift measurements of servo- mechanisms and feedback circuits.
	1210-C Unit RC Oscillator, \$180	20 cycles to 0.5 Mc (sine or square waves)	80 mw/7 v 40 mw/45v 0-30 v, p-p	500 Ω 12,500 Ω 2,500 Ω	<1.5% <5% square waves	Multi-purpose lab signal source — converts to sweep oscillator with Synchronous-Dial Drive.
	1301-A Low-Distortion Oscillator, \$595	20-15,000 cycles (27 fixed frequencies)	18 mw/6.6 v 100 mw/30 v	600 Ω balanced or grounded 5000 Ω grounded	<0.1%	Drift not greater than 0.02% per hour after first 10 min. — frequency range extends to 2 cycles with 1301-P1 Extension Unit (\$80).
	1302-A Oscillator, \$500	10-100,000 cycles	40 mw/10 v 20 mw/5 v 80 mw/20 v	600 Ω balanced 300 Ω grounded 5000 Ω grounded	<0.5% <0.5% <1%	Output Voltage Constant $\approx$ 1.0 db.
	1304-B Beat-Frequency Oscillator, \$710	20-20,000 cycles 20,000-40,000 cycles	1 w/50 v	600 Ω balanced or grounded	<1%	Converts to Sweep Oscillator with 908-P Dial Drive — high stability, low hum. Can also be used with Graphic Level Recorder. See page 3.
	1307-A Transistor Oscillator, \$97	400, 1000 cycles (2 fixed frequencies)	6 mw/2 v	600 Ω	<5%	Battery operated, with output meter — small and compact.
	1214-A Unit Oscillator, \$80	400, 1000 cycles	200 mw/60v	8000 Ω grounded or ungrounded	<3%	Compact fixed-frequency oscillators for bridge measurements, use as modulators, and as general labora- tory instruments. Have built-in power supplies.
	1214-D Unit Oscillator, \$100	120 cycles	400 mw/60 v	Matches input Z of 1611-B Bridge	<3%	
	1214-M Unit Oscillator \$75,	1 Mc	300 mw/7 v	50 Ω	<3.5%	
	1311-A Audio Oscillator, \$190	50c to 10 kc in 11 fixed frequencies	1 w/100v	step-variable to match input Z of most bridges	<0.5%	Well suited as a bridge generator.
	1300-A Beat-Frequency Video Generator \$1950	sine wave: 20c-12 Mc square wave: 20c-2 Mc	10 v/30 mw	attenuator output: 74 Ω direct output: 820 Ω	sine wave: 20c-20 kc, <1.4% 20 kc-12 Mc, <4% square wave: rise time, 0.075 μ sec above 300 kc	Sweep generator (60c sweep rate) from 20kc-12Mc. Sweep width ad- justable from 0 to $\pm$ 6Mc. See de- scription page 3.
	1330-A Bridge Oscillator, \$650	400 cycles, 1000 cycles 5kc-50Mc	0.75 w/12 v 1 w/10 v	50 Ω 20-80 Ω	<3.5%	Internal 400- and 1000-cycle mod- ulation — excellent shielding for bridge work.

Unit Instruments

(Indicated throughout this Bulletin by **U** next to Type Number)

Flexible, Low-Cost, Instrument "Building Blocks"

Each Unit Instrument provides a basic electrical function in a compact, portable package. All frills are omitted in the interest of *maximum performance at minimum price*: no concessions are made in either electrical performance or reliability.

These basic "building-blocks" permit the formation of a wide variety of measuring systems to meet practically any need. Unit Instruments (not containing their own built-in power supplies) are designed to operate from any of five Unit Power Supplies

Power Supplies for Unit Instruments

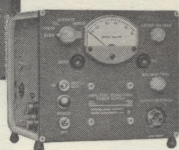
1203-B Power Supply, \$50

U 6.3v ac at 3 amp;
300v dc at 50 ma.
For 210-250v
operation, 1203-
BQ-18, \$60



1201-B Regulated Power Supply, \$90

U 300v dc, regulated to $\pm$ 0.25%,
70 ma; 6.3v ac at 4a, unregulated
For 210-250v operation, 1201-
BQ18, \$100



1263-B Amplitude Regulating Power Supply, \$355.

U Automatically
maintains output of vhf and uhf
Unit Oscillators at a preset value as oscillator fre-
quency is varied. Ideal when using mechanical
sweep drives.



1205-B — Adjustable Regulated Unit Power Supply . . . \$295

Excellent regulation is achieved by cascading thyatron reg-
ulator and conventional regulator circuits. The conventional
regulator can be designed for high efficiency since it need
correct only over a narrow range.



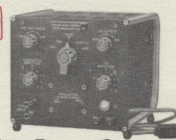
Outputs:
0-300v dc, 200 ma
—150v dc, fixed, 5 ma
6.3v ac, 5a 6.3 ac, 5a

Regulation: 0.1v from no load to
full load
Ripple: less than 1-mv rms
Size: only 9 $\frac{1}{2}$ " x 5 $\frac{1}{4}$ " x 8 $\frac{3}{4}$ "

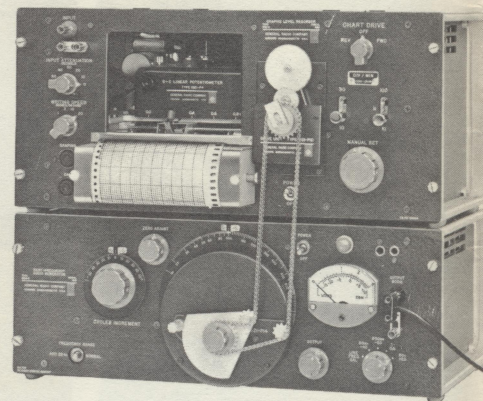


1264-A Modulating Power Sup- ply, \$285.

A regulated dc supply, a
Schmitt-driven series-type power mod-
ulator, and a 1-kc multivibrator designed
to produce 100% pulse and square-wave
modulation of vhf and uhf UnitOscillators.



Automatic Frequency



Graphic Spectrum Analysis

The Recorder readily couples to the 1554-A Sound and Vibration Analyzer (see page 17) for contin-
uous plotting of the spectrum from 25 to 250c, 250c
to 2.5 kc, and 2.5 to 25 kc. Manual resetting of con-
trols is necessary only between ranges. (The
recorder also couples to the superseded Type 760-B
Sound-Analyzer for coverage from 25 to 7500c.)

- 1304-B Beat-Frequency Generator . . . \$710
- 1554-A Sound and Vibrator Analyzer . . . \$1060
- 1521-A Graphic Level Recorder . . . \$995
- 1521-P10 Drive Unit . . . \$72
- 1521-P14 Link Unit . . . \$18

0.01 cycle to 7425 Mc



	Type	Frequency Range	Maximum Output/ Open Circuit Volts	Nominal Load Impedance	Harmonic Distortion	Additional Features
	1211-C Unit Oscillator, \$305	0.5-5 Mc 5-50 Mc	1500 mw 500 mw	50 Ω	Convert to sweep oscillators with 907, 908 Dial Drives, or unique 1750-A Sweep Drive — output can be regulated with 1263-B Amplitude-Regulating Power Supply (1263-B is not recommended for use with 1208-B). May be sine-wave modulated with external source.	Compact, inexpensive, well shielded — frequency increments of 0.2% per division.
	1215-B Unit Oscillator, \$210	50-250 Mc	100 mw	50 Ω		Semi-butterfly, tuned circuit with no moving contacts.
	1208-B Unit Oscillator, \$230	65-500 Mc	200 mw	50 Ω		Very wide range, thorough shielding.
	1209-BL Unit Oscillator, \$260	VHF and UHF 180-600 Mc	300 mw	50 Ω		Similar to 1209-B
	1209-B Unit Oscillator, \$260	250-920 Mc	200 mw	50 Ω		Butterfly circuit avoids uhf tuning difficulties — excellent stability.
	1361-A UHF Oscillator, \$285	450-1050 Mc	125 mw	50 Ω		Has calibrated output attenuator
	1218-A Unit Oscillator, \$465	900-2000 Mc	200 mw	50 Ω		Audio, pulse, square-wave or frequency modulation from external source.
	1360-A Microwave Oscillator, \$1100	Special Purpose 1.7 to 2.8 Gc 2.8 to 4.1 Gc	300 mw (100 mw typical)	50 Ω	Residual fm is 0.5ppm on low range and 0.2 ppm on higher.	Internal 1-to-3-Mc sweep at 1 kc or line frequency. May be square-wave, pulse, or frequency modulated from external source.
	1220-A Klystron Oscillator \$275 without tube	8 Klystrons available to cover 2700 to 7425 Mc range.	40 mw	50 Ω	Klystron tube prices range \$65 to \$102	Compact, low-cost microwave source or Klystron power supply — internal 1-kc square wave modulation; pulse or frequency modulation from external source.
	1213-D Time/Frequency Calibrator, \$310	5-Mc crystal provides 10-kc, 100-kc, 1-Mc, 10-Mc fundamentals and harmonics to 1000 Mc	10-30 v, p-p video output	cath, follower approx. 300 Ω	Generates harmonic spectrum	Compact secondary frequency standard — accurate timing source for scope calibration, etc. — short-term accuracy is 2 parts in 10 ⁷ .

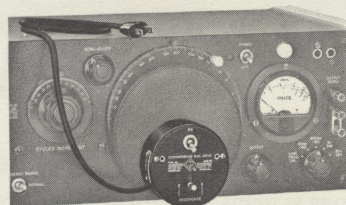
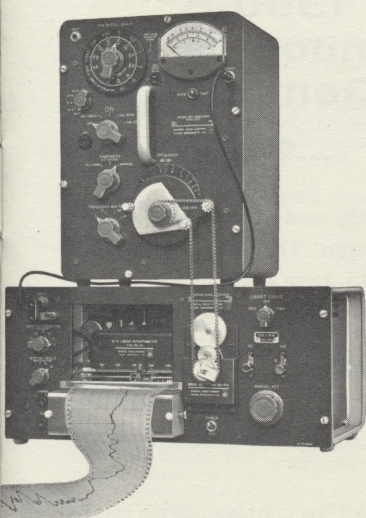
Unit Oscillators except 1214 Series require Unit Power Supplies. 1203-B Unit Power Supply, \$50 — 1201-B Unit Regulated Power Supply, \$90. For 210-250V operation, 1203-BQ18, \$60, or 1201-BQ18, \$100.

Response Measurements

A system useful for studying filters, networks, amplifiers, equalizers, loudspeakers, microphones, and transducers of all types.

The 1521-A Graphic Level Recorder (described on page 17) plots frequency-response data automatically when coupled by Drive and Link Units to the 1304-B Beat-Frequency Audio Generator.

The Generator lends itself well to automatic recording, since its output is flat within ± 0.25 db from 20c to 20 kc. Recorded plot is logarithmic.



Type 908-P
Synchronous Dial Drives . . . \$35 each
Self-reversing dial drives that readily attach to G-R Unit Oscillators, 1304-B and 1330-A Oscillators and other equipment with G-R Type 907 and 908 Dials — 4-rpm model for use with graphic recorders; 30-rpm model for use with oscilloscopes.

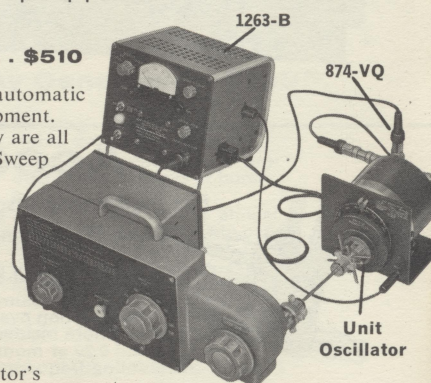
Mechanical Sweep Drives

adapt Manually-Operated Equipment
to Automatic Sweep Applications

Type 1750-A Sweep Drive . . . \$510

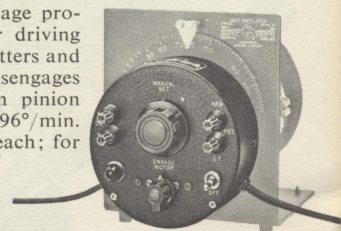
Attaches to knobs, dials or shafts for automatic sweeping of oscillators and other equipment. Sweep arc, speed, and center frequency are all continuously variable, even while the Sweep is in motion. Speed is adjustable from 0.5 to 5 cps — a CRO sweep voltage proportional to shaft-angular position is supplied, permitting calibration of CRO horizontal axis — limit switch, universal coupling system and many other features.

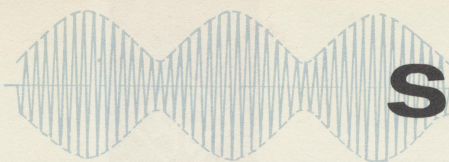
The Type 1263-B Regulated Power Supply is designed to power the Unit Oscillator as well as to keep the oscillator's output constant over wide ranges of frequency. It does this by comparing the rectified r-f output of the oscillator against an internal reference voltage, and applying any necessary corrections to the oscillator through its plate voltage supply. With this setup, output is maintained within 2% over the oscillator's entire frequency range.



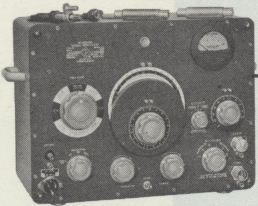
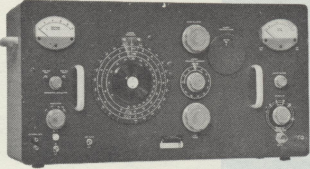
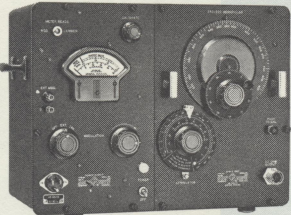
Type 907-R144 and 908-R96 Dial Drives . . .

Similar to 908-P but provide sweep voltage proportional to shaft position as well for driving horizontal axes of oscilloscopes, x-y plotters and other recording systems — panel knob disengages motor for manual operation — 4 rpm pinion speed (144°/min. for G-R 907 Dial and 96°/min. for 908 Dial). Model for 907 dial, \$70 each; for 908 dial, \$67 each.





Signal Generators

	Type	Range	Output	Modulation	Envelope Distortion	Noise Level	Incidental FM	Leakage
	1001-A \$975	5 kc - 50 Mc in 8 ranges Accuracy: ±1%	2 outputs: 0.1 μ v to 200 mv at 10 Ω , 25 Ω at end of terminated output cable (50 Ω adaptor furnished); 2v, open circuit at 300 Ω	Adjustable from 0 to 80%. Internal mod. frequency is 400c; external mod. from 20c to 15 kc	less than 8% at 80% modulation	noise level corresponds to about 0.1% modulation	at 80% a.m. varies from 30 to 300 ppm	less than 1 μ v per meter 2 feet from generator
	805-D \$1975	16 kc - 50 Mc 7 ranges Accuracy: ±1%	0.1 μ v to 2v at 75 Ω . Termination unit furnishes additional output impedances of 37.5 Ω , 7.1 Ω , and 0.75 Ω (50 Ω output available with accessory 805-P2 Termination Unit, \$25)	Adjustable from 0 to 100%. Internal mod. frequencies are 400c and 1 kc; external mod. from 50c to 15 kc	less than 5% at 80% modulation	40 db below 80% modu- lation	at 100% a.m., 0.05%; at 30% a.m., 0.02% (at 50 Mc)	less than 5 μ v per meter 2 feet from generator
	1021-AV \$765	2 ranges 40 - 50 Mc 50 - 250 Mc Accuracy: ±1%	0.5 μ v to 1v at 50 Ω	Adjustable from 0 to 50%. Internal mod. frequency is 1 kc; external mod. from 30c to 15 kc	less than 5% at 50% modulation	corresponds to about 0.2% modulation	at 50% a.m., about 100 ppm to 100 Mc; 500 ppm at 250 Mc	sufficiently low for meas- urements on receivers having 1 μ v sensitivity
	1021-AU \$740	250 - 920 Mc in one range Accuracy: ±1%					at 50% a.m., about 100 ppm to 400 Mc; 1000 ppm at 920 Mc	

NEW 1025-A Standard Sweep-Signal Generator, \$3250.

Covers 0.7 to 230 Mc in ten overlapping octave ranges plus two bandsread ranges of 400 to 500 kc and 10.4 to 11 Mc (other ranges available on special order). A high-quality standard-signal generator, the 1025-A uses a motor-driven variable air capacitor to provide the swept frequency. This method provides a high output signal which is free from harmonic distortion and spurious responses, and is extremely stable. This technique also permits the generation of a clean, sharp marker which is continuously variable and accurately calibrated both in frequency and amplitude. The 1025-A can be quickly converted to manual (cw) operation without changing connections or control settings on either the generator or display device.

Ranges: 0.7-1.4 Mc
1.3-2.6 Mc
2.4-4.8 Mc
4-8 Mc
7-14 Mc
13-26 Mc
24-48 Mc
40-80 Mc
65-140 Mc
100-230 Mc

Sweep Width: Entire selected range is swept. However, visual presentation of swept range can be expanded to permit full oscilloscope display of portions of range as small as 10% with EXPAND DISPLAY and DISPLAY START controls.

Selected range is swept from low end to high end in 22.2 msec twenty times a second. Output is blanked off during return sweep. A saw-tooth sweep voltage is provided which is synchronized with frequency, and adjustable in starting point and amplitude (DISPLAY START and EXPAND DISPLAY controls, respectively).

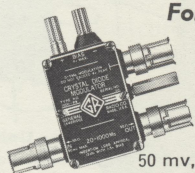
Stability: Drift less than $\pm 0.1\%$ for frequency for 5 hours after one-hour warm-up. Frequency dial accuracy is within $\pm 0.5\%$.

Marker: Continuously adjustable from 3mv to 1v. Accuracy of indication is typically better than $\pm 10\%$. Shape and width of marker permit resolution to better than $\pm 0.1\%$ of indicated frequency.

RF Output: Adjustable from 0.3 μ v to 1v behind 50 ohms (-123 to 7 dbm power into 50 ohms). Output is flat to within $\pm 1\%$ up to 100 Mc and within $\pm 3\%$ up to 230 Mc. RF amplitude indicated to a typical accuracy of better than $\pm 10\%$.

Accessories

For Modulating Oscillators and Signal Generators Over Wide Ranges with Negligible fm . . .



1000-P6 Crystal-Diode Modulator, \$40

for wide-band amplitude modulation over 20-1000-Mc carrier range where incidental fm must be negligible . . . 50 mv, rf, and 0.2v at modulation terminals produces 30% am; modulating frequencies from 0 to 5 Mc.

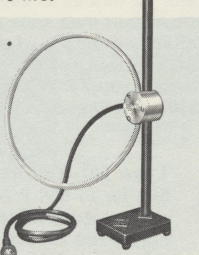
For Receiver Testing . . .

1000-P10 Testing Loop, \$50

3-turn loop for testing radio receivers by IRE Preferred Method. **1000-P3 100:1 Voltage Divider, \$20**, used with 1001-A Generator, provides accurately-known voltage for loop antenna.

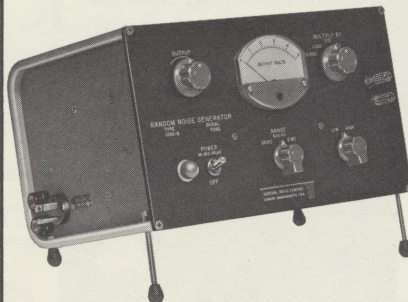
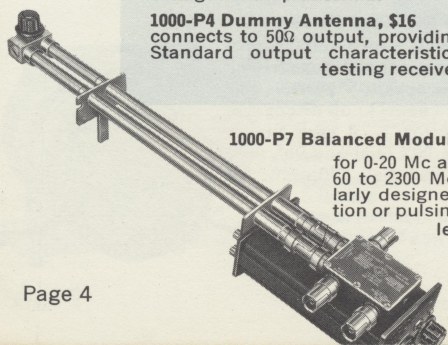
1000-P4 Dummy Antenna, \$16

connects to 50 Ω output, providing IRE Standard output characteristics for testing receivers.



1000-P7 Balanced Modulator, \$225

for 0-20 Mc amplitude modulation over 60 to 2300 Mc carrier range — particularly designed for 100% linear modulation or pulsing; rise time contribution is less than 20nsec.



1390-B Random-Noise Generator

...\$295

Wide-band noise source for checking audio equipment, communications systems, and for wide-band modulation. The Generator is also used with suitable amplifying equipment to drive shake tables.

- Three Frequency Ranges: within ± 1 db from 20c to 20 kc; 20c to 500 kc; 20c to 5 Mc (3 db down at 5c).
- High Output: at least 3v for 20-kc range, 2v for 500-kc range, and 1v for 5-Mc range.
- Built-in 80-db attenuator supplies

ments output meter to provide accurate output levels from below 30 μ v to over 3v.

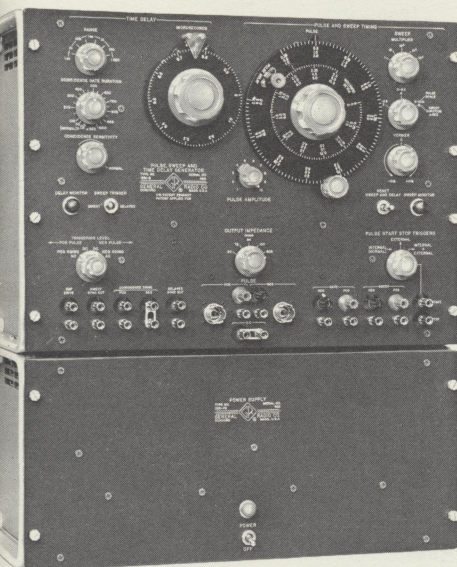
- Built-in extendible legs tilt panel for easy viewing.
- Panel extensions supplied for relay-rack mounting.

Also Available . . . **1390-P2 Pink-Noise Filter . . . \$45.** Filter provides 3-db per octave slope for use with constant-percentage-bandwidth frequency analyzers.

Pulse Equipment



Type 1391-B Pulse, Sweep, and Time-Delay Generator ... \$2025



**Complete, Accurate
Time-Domain Measurements
with One Instrument**

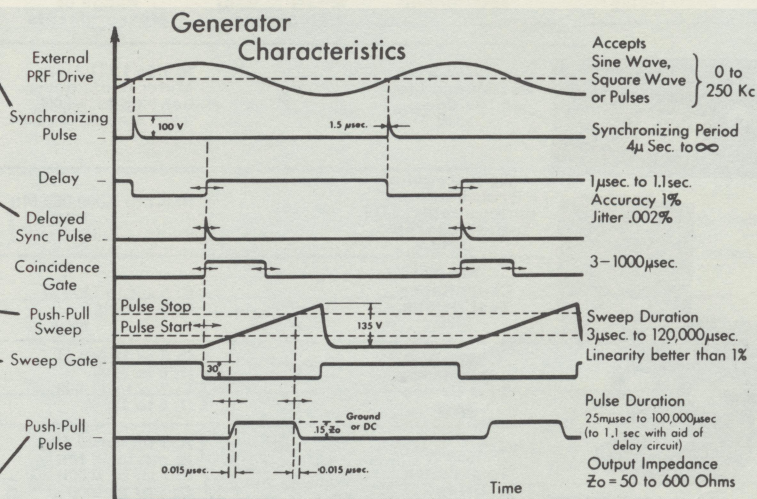
Direct synchronizing pulse timed by the input signal.

Delayed synchronizing pulse accurately adjustable in time by delay generator. Built-in coincidence circuit for timing the delayed synchronizing pulse by externally generated pulses fed into the instrument.

Push-pull sawtooth voltage of sufficient amplitude to be applied to the deflection plates of oscilloscope for examining the generator's output pulses, or for use in driving auxiliary equipment.

Push-pull gating pulses with same duration as the sweep.

Positive or negative pulses with excellent shape characteristics, continuously adjustable in duration, amplitude, impedance level, and delay with respect to (a) the direct sync pulse and (b) the sweep.



WIDE RANGES OF

Pulse Duration: 25 nsec to 1.1 sec
Pulse Repetition Rate: 0 to 250 kc
Time Delay: 1 μ sec to 1.1 sec
Delay Repetition Rate: 0 to 400 kc
Output Impedance: 0 to 600 ohms

SUPERIOR PULSE CHARACTERISTICS

Excellent rise and decay times — less than 0.015 μ sec.
 No duty-ratio or frequency restrictions on pulse.

VERSATILITY

Panel controls for all important instrument characteristics. Binding posts provide ready access to triggers, gates, delayed signals, pulses, and internal sweeps shown above.

HIGH BASIC TIMING ACCURACY Timing scales are linearly calibrated and accurate to 1%.

NEW-1217-B Unit Pulse Generator

.... \$250.



Repetition Rate: with internal drive, 2.5 to 500 kc in calibrated 1-3 sequence (continuous with uncalibrated Δf control); with external drive, dc to 1 Mc.

Pulse Duration Range: 100 nsec to 1 second; accuracy $\pm 5\%$

Rise and Fall Time: Less than 20 nsec into 50- or 100-ohm load (typically about 12 nsec).

Output: Positive and negative 40-ma pulse available simultaneously (40-v peak into 1000- Ω load). Overshoot and noise less than 5% of amplitude; ramp-off, less than 1%.

Sync Pulse: Positive and negative 10-v pulse and 5-v delayed sync pulse available for triggering other equipment.

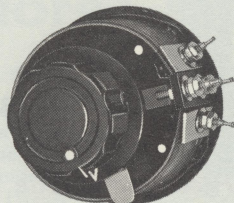
Power Supply Recommended: 1203-B Power Supply, \$50.

Nothing else available approaches this instrument's performance and versatility for the price ... it provides "clean" and stable pulses over wide ranges of amplitude, duration, and repetition rate. Several Unit Pulsers can be easily combined to form an inexpensive generator of composite signals.

Variable Delay Lines

314-S86 Variable Delay Line

Unique skewed turn principle plus solid-silver winding and precious-metal brush provide reliable 0 to 0.5- μ sec delay with flat time-delay characteristic up to 10 Mc ... low 200- Ω input impedance ... good transient response ... \$60.



301-S104 Variable Delay Line

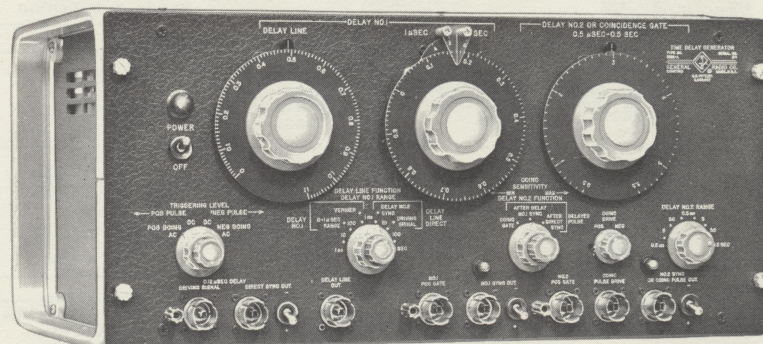
Delay Range: 0 to 25 nanoseconds
 Characteristic Impedance: 190 ohms $\pm 15\%$
 DC Resistance: 5.5 ohms $\pm 20\%$
 Price: \$48



Type 1219-A Unit Pulse Amplifier

... \$220.

Provides 55 watts peak power over a wide range of impedances; current pulses up to 600 ma, and voltage pulses in excess of 250 volts at pulse durations as small as 0.1 μ sec and repetition frequencies up to 2 Mc. Drive requirements: 20v negative or 2.5v positive pulse behind 2000 Ω or less. Noise and hum are less than 1% of pulse amplitude. Built-in power supply.



Type 1392-A Time-Delay Generator .. \$1095.

- Total range of delay 0-1.6 sec
- Two independent delay circuits
- Ten-turn dial calibration is accurate to 1% over complete range — even on 1 to 10 μ sec range
- Built-in provision for time modulation

- All long delays have associated gate pulse outputs
- Coincidence circuitry for producing exact delays or bursts, and for calibration
- Input circuits accept almost any waveform from dc to over 300 kc to initiate action
- High accuracy, high linearity, high resolution, low jitter

The 1392-A produces two variable delays. Accuracy of delay is comparable with digital apparatus when the 1392-A is used with a source of crystal controlled pulses.

Delay No. 1

Range: 0 to 1.1 sec in seven ranges

Accuracy: 1 μ sec to 1.1 sec range; $\pm 1\%$ of dial reading. 0 to 1 μ sec range; $\pm 0.01 \mu$ sec

Provision for time modulation: PPM, PDM

Jitter: less than 1:30,000

Delay No. 1 Sync: Amplitude, at least ± 25 v; Duration, 0.1 $\pm 0.02 \mu$ sec

Delay No. 2 or Coincidence Circuit

Range: 0.5 μ sec to 0.5 sec in six ranges

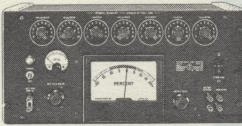
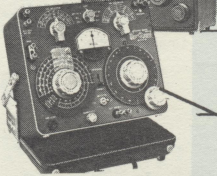
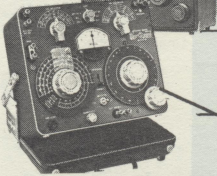
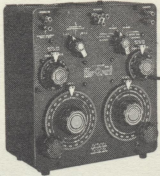
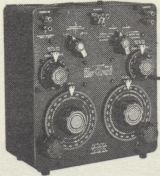
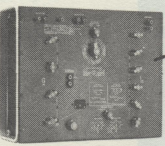
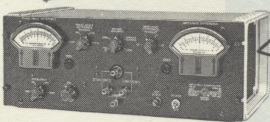
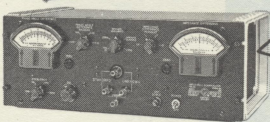
Accuracy: $\pm 3\%$ of dial reading (can be calibrated by DELAY NO. 1)

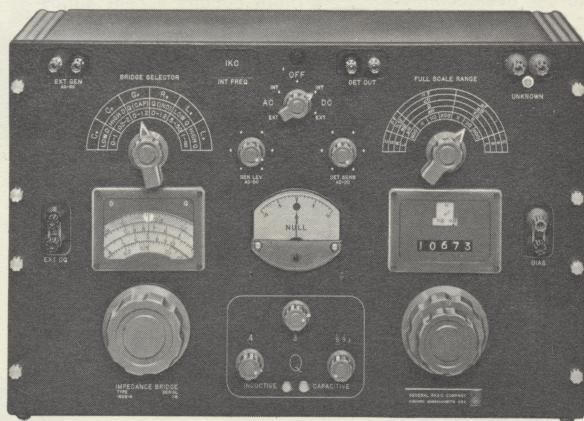
Delay No. 2 Sync: Amplitude, at least ± 20 v; Duration, 0.13 $\pm 0.02 \mu$ sec

Coincidence Circuit Input Requirements: + or - pulse, 5 v or more, with 0.1 μ sec rise time. Single pulses may be selected over input range of 1c to 1.7 Mc.

Bridges for measuring RESISTANCE • CAPACITANCE

VACUUM-TUBE and

Instrument	Measurement Frequency	Range of Measurements	Accuracy	Recommended Generator	Recommended Null Detector	Features and Typical Uses
 1652-A Resistance Limit Bridge \$540	dc	R: 1 to 1,111,111Ω Meter reads deviations up to ±20% from standard value	±0.5% as limit bridge ±0.25% by null method	self contained		Production testing and inspection or laboratory work. Three high-sensitivity models having ±2%, ±5%, or ±10% full-scale ranges available on special order. Write for complete information.
 544-B Megohm Bridge with a-c power supply, \$415 battery operated, \$290	dc	R: 0.1 to 1,000,000 MΩ	±3% to 1000 MΩ ±4% to 100,000 MΩ	self contained		Measures high resistance — insulation, volume resistivity, etc.
 740-B Capacitance Test Bridge \$300	60 c	C: 5 μf to 1100 μf D: 0 to 50%	±1% ±1.5% of full scale	self contained		Production-test tool—measures ungrounded capacitors.
 1611-B Capacitance Test Bridge \$665	60 c 120 c	C: 0 to 11,000 μf D: 0 to 60% C: 1 μf to 11,000 μf D: 0 to 120%	±1% ±2% ±1% ±2%	60c generator built in. 1214-D for 120 c	self contained	Testing insulators, bushings, cables, grounded capacitors, and electrolytic capacitors.
 1650-A Impedance Bridge \$460	dc 20 c to 5 kc 20 c to 20 kc (D & Q ranges are function of frequency)	R: 1 mΩ to 10 MΩ G: mΩ to 10 MΩ L: 1 μh to 1000h C: 1 pf to 1000 μf Q: 0.02 to 1000 at 1 kc D: 0.001 to 50 at 1 kc	±1% ±1% ±1% ±1% ±5% ±5%	1-kc generator built in. 1210-C for 20 c to 20 kc	self contained (earphones may be used)	A universal bridge for general-purpose laboratory or production use. Provision for applying dc to inductors, capacitors, or diodes during measurements. Test jig available for rapid component checking, (1650-P1, \$19).
 1608-A Impedance Bridge \$1175	dc 1 kc	R: 0.05 mΩ to 1.1 MΩ G: 0.05 nΩ to 1.1 Ω R: 0.05 mΩ to 1.1 MΩ G: 0.05 nΩ to 1.1 Ω C: 0.05 pf to 1100 μf J: 0.05 μh to 1100 h D: 0.0005 to 2 Q: 0.0005 to 2000	±0.1% basic accuracy; ±0.2% at 10 kc	1-kc generator built in. Use 1210-C for other frequencies	dc and selective 1-kc detector built in. Use 1232-A for other frequencies	A high-precision bridge with digital readout; automatic decimal point location; standard EIA test voltages that can be set over most of R range. Plug-in modules for other test frequencies available on special order.
 1603-A Z-Y Bridge \$475	20 c to 20 kc	R: 0 to ±1000 Ω G: 0 to ±1000 μmho X: 0 to ±1000 Ω B: 0 to ±1000 μmho	±1% ±1% ±1% ±1%	1210-C	1232-A or 1212-A	Directly measures quadrature components of any impedance from 0 to ∞.
 1632-A Inductance Bridge \$950	100c, 1 kc usable to 10 kc with slight decrease in accuracy	L: 111 μh to 111h G: 111 μmhos to 111 mhos	±0.1% Inductors having nearly equal values can be compared to a precision of 1 part in 10 ⁵	1304-B or 1210-C with 1206-B Amplifier	1232-A	For the precise measurement and standardization of inductors.
 1633-A Incremental Inductance Bridge \$925	Direct reading at 9 frequencies from 50c to 15.75 kc	L: 0.2 μh to 1000h (dependent on frequency) R: 10 mΩ to 1 MΩ Q: ∞ to 1	±1% ±2% ±2%	1265-A DC Power Supply 1266-A AC Power Supply	self contained	An active bridge capable of making inductance and loss measurements at voltages up to 1250v and currents up to 7a (50a with extension unit). Also useful for the measurement of nonlinear elements.
 1605-A Impedance Comparator \$830	100 c, 1 kc 10 kc, 100 kc	Z: 2 Ω to 20 MΩ ΔZ: ±0.01% to ±10% Δθ: ±0.0001 to ±0.1 radian	±0.01%	self contained	self contained	Panel meters simultaneously indicate % differences in magnitude and phase angle between unknown and external standard — precision and speed in one instrument.
 1605-AH Impedance Comparator \$925	100 c, 1 kc 10 kc, 100 kc	Z: 20 Ω to 20 MΩ ΔZ: ±0.003% to ±3% Δθ: ±0.00003 to ±0.03 radian	±0.003%	self contained	self contained	For precise measurements — has 3-to-1 increase in sensitivity over the 1605-A.



Ranges
R: 0.05 mΩ to 1 MΩ in 7 ranges (ac or dc)
G: 0.05 nΩ to 1Ω in 7 ranges (ac or dc)
C: 0.05 pf to 1000 μf in 7 ranges (series or parallel)
L: 0.05 μh to 1000 h in 7 ranges (series or parallel)

at 1 kc:
D (series C): 0 to 1
Q (series L): 0.5 to 50
Q (series R): 0 to 1.2 inductive
D (parallel C): 0.02 to 2
Q (parallel L): 1 to ∞
Q (parallel G): 0 to 1.2 Capacitive

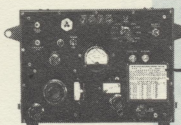
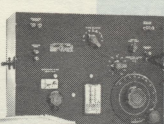
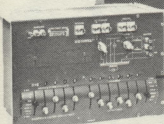
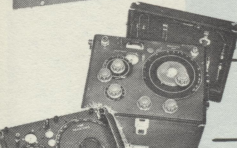
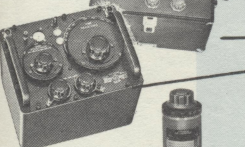
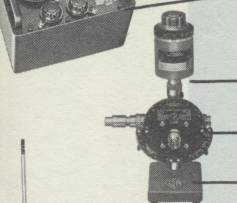
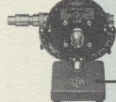
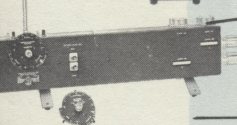
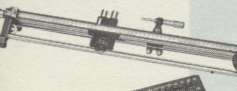
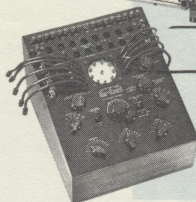
NEW 1608-A IMPEDANCE BRIDGE... \$1175

A High-Precision Bridge That's Easy to Use and Read

- ★ Digital readout of C, R, L, and G with automatic decimal-point location; the unit of measurement automatically indicated. Appropriate D & Q scales also automatically indicated.
- ★ ±0.1% basic C, R, L, and G accuracy; high phase accuracy at 1 kc permits determinations of D to 0.0005 and Q to 2000. Measurements of C, R, L, and G may be made to ±0.2% at 10 kc.
- ★ Self-contained oscillator and selective null detector. Plug-in modular construction facilitates changing fixed frequency (1-kc unit supplied).
- ★ Three internal dc supplies allow standard EIA voltages to be set over most of resistance range.
- ★ Provision for external d-c bias or external generator and null detector (dc or ac, 20c to 20 kc).



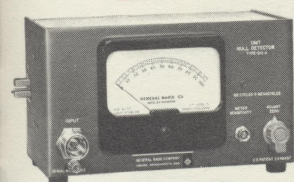
INDUCTANCE • IMPEDANCE • DISSIPATION FACTOR TRANSISTOR COEFFICIENTS

	Instrument	Measurement Frequency	Range of Measurements	Accuracy	Recommended Generator	Recommended Null Detector	Features and Typical Uses
	1613-A Capacitance Bridge \$1875	400 c	C: 5 pf to 11,000 pf D: 0 to 0.11	$\pm 0.1\%$ ($\pm 0.8\%$ at 5 pf) $\pm 2\%$	self contained	self contained	400-cycle model designed primarily as a calibrator for 3-terminal capacitive type aircraft fuel-gage testers. Panel lights indicate direction of capacitive unbalance
	716-C Capacitance Bridge \$675 (rack model, \$645)	1 kc 0.1, 10, 100 kc 0.1, 1, 10, 100 kc 0.1, 1, 10, 100 kc	C: 100 pf to 1.15 μ f C: 100 pf to 1150 pf C: 0.1 pf to 1050 pf D: 0.00002 to 0.56	$\pm 0.1\%$ (± 1 pf x C multiplier setting) $\pm 0.2\%$ (substitution) $\pm 2\%$	1302-A 1311-A 1210-C	either 1232-A or 1212-A with appropriate filters	For capacitance standardization precision measurements, dielectric tests and studies.
	716-CS1 Capacitance Bridge \$620 (rack model, \$595)	0.5 to 3 Mc	C: 0.1 to 1150 pf D: 0.00002 to 0.56	$\pm 0.2\%$ $\pm 0.2\%$	1214-M for 1 Mc 1211-C for other frequencies	1212-A	High-frequency model of 716-C.
	1615-A Precision Capacitance Bridge \$1475	100 c to 10 kc	C: 10 μ pf to 1 μ f D: 0.000001 to 1	$\pm 0.01\%$ $\pm (0.1\% + 7$ ppm)	1311-A	1232-A	A unique transformer ratio-arm bridge, ideal for intercomparison measurements of capacitance standards.
	916-AL Radio-Frequency Bridge \$750	50 kc to 5 Mc	X: $\pm 11,000 \Omega$ at 100 kc R: 0 to 1000 Ω	$\pm 2\%$ $\pm 1\%$	1211-C or 1330-A	communications receiver	Measures impedances of antennas, transmission lines; measures low impedances simply and directly at radio frequencies.
	1606-A Radio-Frequency Bridge \$695	400 kc to 60 Mc	X: $\pm 5,000 \Omega$ at 1 Mc R: 0 to 1000 Ω	$\pm 2\%$ $\pm 1\%$	1211-C, 1215-B, or 1330-A	communications receiver	Same uses as 916-AL but for higher frequencies.
	1602-B Admittance Meter \$295	20 to 1500 Mc	B and G: 0.1 to 1000 m Ω X and R: 1 to 10,000 Ω	$\pm 3\%$	1208-B 1215-B 1209-B 1361-A 1218-A	Type DNT Detectors	For measuring Y, Z, and VSWR of coaxial systems.
	1607-A Transfer Function and Impedance Bridge \$1775	25 to 1500 Mc	Z ₂₁ : 0 to 1500 Ω Y ₂₁ : 0 to 600 m Ω V ₂ /V ₁ : 0 to 30 I ₂ /I ₁ : 0 to 30 B, G: 0 to 400 m Ω X, R: 0 to 1000 Ω	$\pm 5\%$	1208-B 1215-B 1209-B 1361-A 1218-A	Type DNT Detectors	For the measurement of 4-terminal transfer functions and Z and Y
	874-LBA Slotted Line \$255	300 to 5000 Mc	VSWR	3% or better	See 1602-B and 1607-A		Standard instrument for uhf measurements
	1661-A Vacuum-Tube Bridge \$1100 (also measures transistor low-frequency parameters)	270 to 400c, 1 kc	μ : 0.001 to 10,000 rp: 50 Ω to 20 M Ω gm: 0.02 to 50,000 μ mho also measures h _i , h _r , h _f , and h _o of transistors	$\pm 2\%$ $\pm 2\%$ $\pm 2\%$ } at mid ranges	1214-A	1232-A or 1212-A	Adaptors furnished with instrument for measuring characteristics of receiving tubes and transistors.

Null Detectors



1212-A Unit Null Detector ... \$170



for bridge measurements over 20c-to-5Mc range — logarithmic response gives 120db on-scale range — 40 μ v at 1kc gives 1% deflection, yet 100v required to drive meter off scale. Requires Unit Power Supply.

Accessory Filters for 1212-A



1212-P1 High-Pass Filter, \$12.

1212-P2 One-Megacycle Filter, \$30.

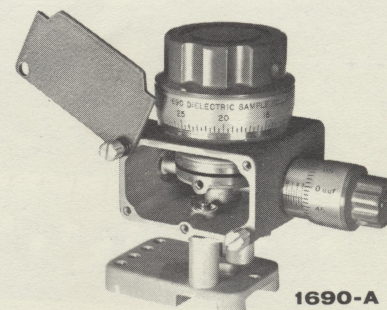
Type	Frequency	Characteristics
1212-P1 High-Pass Filter, \$12.	Cuts off at 20 kc	50db attenuation of low-frequency noise and hum; for bridge measurements and general laboratory use.
1212-P2 One-Megacycle Filter, \$30.	1 Mc	Provides 20-30 db insertion gain when used with 1212-A Null Detector for 1 Mc bridge work.



1232-A Tuned Amplifier and Null Detector ... \$360

Transistorized low-noise, high-gain, tunable amplifier and null detector with a 20c-20 kc range and fixed tuned frequencies of 50 kc and 100 kc ... noise referred to input is 0.1 μ v at any frequency between 20c and 20 kc ... full-scale sensitivity is 1 μ v between 20c-20 kc, 5 μ v at 50 kc, and 10 μ v at 100 kc ... Input impedance, 50 k Ω ... maximum gain, 120 db.

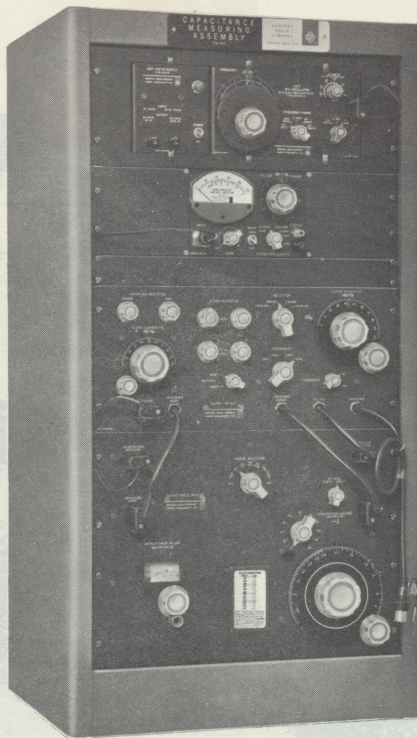
For a description of the Type DNT series of vhf-uhf null detectors see page nine.



1690-A Dielectric-Sample Holder ... \$435

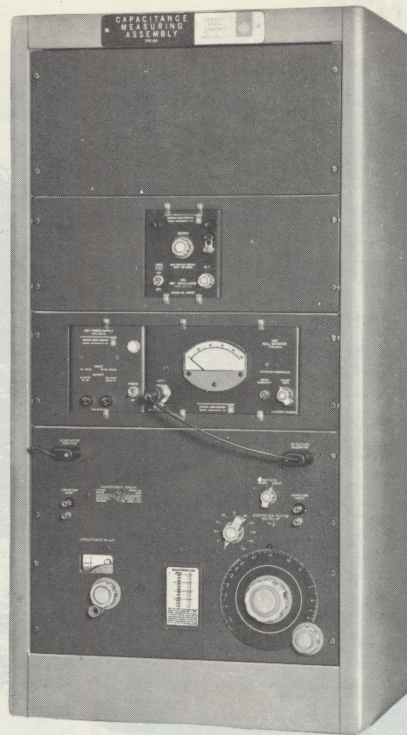
for precise determinations of dielectric constant and dissipation factor of solid dielectric materials ... 2"-dia. electrodes ground to optical flatness and driven by micrometer arrangement for highest accuracy. Attaches to terminals of a wide variety of G-R bridges and high-frequency measuring devices, including Types 544-B, 1611-B, 716-C, 716-CS1, 1615-A, 1602-B, 874-LBA, 1610-B2, and 1610-AH ... for measurements and investigations from dc to at least 100 Mc.

Measuring Systems



1610-B Capacitance Measuring Assembly . . . \$1740
For measurements 30c to 100 kc

for two- or three-terminal measurements of capacitance and dissipation factor (D) . . . direct-reading accuracy is better than $\pm 0.2\%$ for capacitance and ± 0.0005 for D; $\pm 0.1\%$ capacitance accuracy and ± 0.00005 for D with correction chart supplied . . . consists of 716-C Capacitance Bridge, 716-P4 Guard Circuit, 1210-C Unit R-C Oscillator, 1203-B Unit Power Supply, and 1232-A Null Detector in standard relay rack with all interconnections. Also available, the 1610-B2 for 2-terminal measurements only (same as 1610-B less Guard Circuit), \$1465.



1610-AH Capacitance Measuring Assembly . . . \$1080

For Measurements at 1 Mc

. . . of two-terminal capacitance and dissipation factor, as recommended by commercial and military specifications. Same accuracy as 1610-B . . . consists of 716-CS1 1-Mc Capacitance Bridge, 1214-M Unit Oscillator, 1212-A Unit Null Detector, 1212-P2 One-Megacycle Band-Pass Filter, and 1203-B Unit Power Supply.

1630-AL Inductance Measuring Assembly . . . \$2300

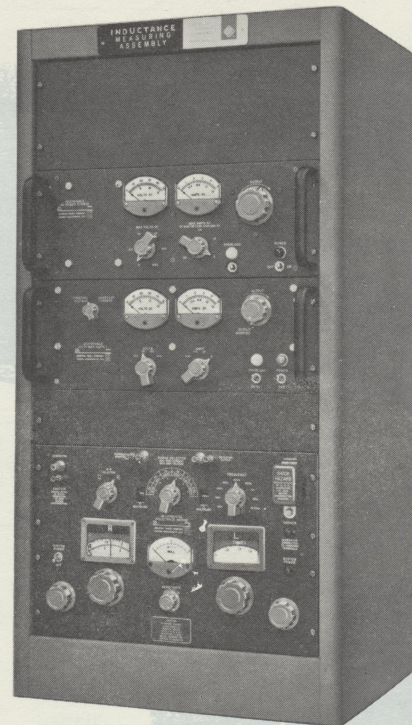
NEW

System for the Dynamic Measurement of Iron-Core Inductors and Non-Linear Devices at ac-dc Voltages up to 1250v and Currents up to 7a. A range extension unit is available to permit measurement up to 50a.

The system consists of the 1633-A Incremental Inductance Bridge with a range of $0.2\mu\text{h}$ to 1000 h for L, $10\text{ m}\Omega$ to $1\text{ M}\Omega$ for R, and ∞ to 1 for Q. Accuracy is $\pm 1\%$ for L and $\pm 2\%$ for R and Q. The 1633-A Bridge has its own null detector which is selective at 50, 60, 100, 120, 400, and 800 cps; and 1, 10, and 15.75 kc.

Included in the Assembly are two power supplies: The 1265-A Adjustable DC Power Supply, useful as a constant-voltage source (up to 400v) or constant-current source (up to 5a) at power outputs to 200w; the 1266-A Line-Frequency Supply, a 60-cycle source of voltages up to 1250v and currents up to 5a at power outputs to 200 va.

The Assembly is rack mounted with sufficient space provided for the addition of a scope for viewing current waveforms and hysteresis loops during measurements. Prices if purchased separately: 1633-A, \$925; 1265-A, \$875; 1266-A, \$360.



NEW

1620-A Capacitance Measuring Assembly . . . \$2065

This system includes the Type 1615-A Bridge, Type 1232-A Tuned Amplifier and Null Detector, a low-noise, high-gain instrument with a 20c to 20 kc range and a full scale sensitivity of $1\mu\text{v}$; and the new Type 1311-A Bridge Oscillator, with 11 fixed frequencies from 50c to 10 kc.

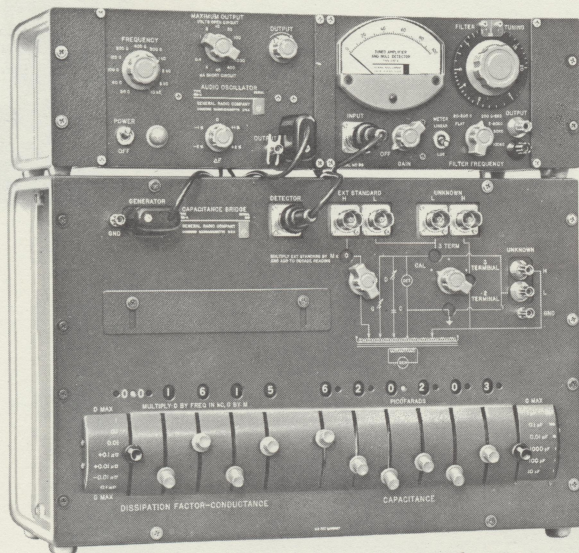
NEW

1615-A Precision Capacitance Bridge . . . \$1475

A 0.01% Bridge featuring lever balancing controls, automatic decimal point location and unit indication to vastly simplify balancing.

- Measures capacitors from $10\mu\text{f}$ to $1\mu\text{f}$ with 6-figure resolution and a direct reading accuracy of $\pm 0.01\%$.
- Measures three-terminal and grounded or ungrounded two-terminal capacitors.
- Measures D from 0.000001 to 1 at 1kc; accuracy, $\pm(0.1\% + 7\text{ ppm})$ of reading.

- Ideal for intercomparison measurements of capacitance standards. One-step comparisons of capacitors differing in value by as much as 10,000 to 1 can easily be made.
- Bridge's internal standards can be quickly checked against each other . . . hence, only one external standard is necessary to establish absolute calibration of the entire set.
- Makes measurements over a range of 100c to 10 kc.



VHF-UHF Measuring Equipment

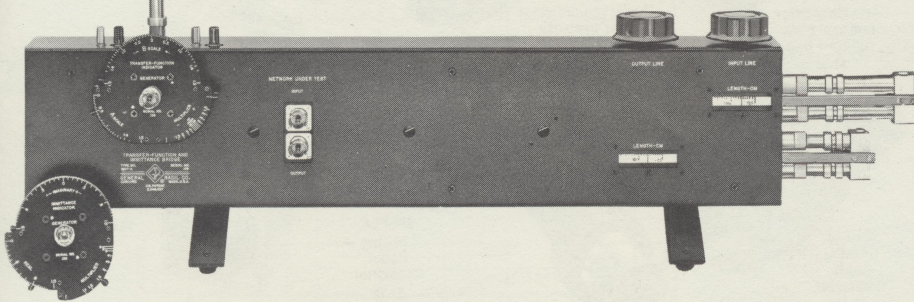


Type 1607-A Transfer-Function and Immittance Bridge ... \$1775

For Direct Measurement at Frequencies
from 25 to 1500 Mc of Complex Impedance, Admittance,
Forward and Reverse Transfer Functions of:

Transistors	Vacuum Tubes	Three- and Four-Terminal Networks	Diodes	Lumped Components	Coaxial Lines
hfb, hfe, hrb, hib, hie, hcb, hoe all short-circuit admittance and open-circuit impedance parameters.	$Y_m (Y_{21}, Y_{12},$ $Y_{11}, Y_{22}, \text{etc.})$	$Z_{11}, Z_{22}, Z_{21}, Z_{12},$ $Y_{11}, Y_{22}, Y_{21}, Y_{12},$ $I_2/I_1, I_1/I_2, E_2/E_1, E_1/E_2$	Z, Y R, C	R, L, C	$Z, VSWR$

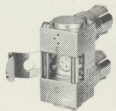
... measures gain and phase shift of amplifiers, transmission circuits, and other active and passive four-terminal networks.



Biasing Provisions: Built in for use with external d-c sources.
Maximum current, 250 ma; maximum voltage, 400 volts.

Measurement	Range	Accuracy (with internal coaxial lines only)
Voltage and current ratios (R)	0-30	$2.5 (1 + \sqrt{R})\% + 0.025$
Transimpedance (Z_{21})	0-1500 ohms	$2.5 (1 + \sqrt{\frac{Z_{21}}{50}})\% + 1.25 \text{ ohms}$
Transadmittance (Y_{21})	0-600 mmhos	$2.5 (1 + \sqrt{\frac{Y_{21}}{20}})\% + 0.5 \text{ mmho}$
Impedance (Z_{11})	0-1000 ohms	$2.0 (1 + \sqrt{\frac{Z_{11}}{50}})\% + 1.0 \text{ ohm}$
Admittance (Y_{11})	0-400 mmhos	$2.0 (1 + \sqrt{\frac{Y_{11}}{50}})\% + 0.4 \text{ mmho}$

ACCESSORIES AVAILABLE



1607-P101 Transistor Mount
for 0.200-inch-pin-circle tri-
ode, common base ... \$60.

1607-P102 Transistor Mount
for 0.200-inch-pin-circle triode, common
emitter ... \$60.

1607-P111 Transistor Mount
for 0.100-inch-pin-circle triode, common
base ... \$65.

1607-P201 Tube Mount for 7-pin
miniature, grounded cathode, for
6AF4, etc. ... \$75.

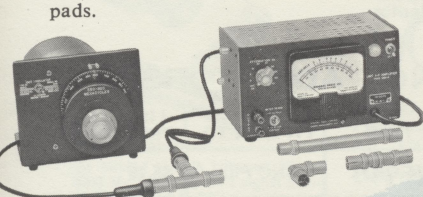
1607-P401 Transistor Mount for
0.200-inch-pin-circle tetrode ... \$65.

**1607-P601 Ungrounded Component
Mount** ... \$25

874-M Component Mount
(grounded) ... \$27.50

DNT DETECTOR

for use at frequencies from 40 to
5000 Mc. ... each consists of a 30-Mc Type 1216-A Unit I-F Amplifier, Type 874-MR
Mixer Rectifier, appropriate Unit Oscillator, and Low-Pass Filter ... Indispensable
aid for impedance, VSWR, voltage, current, and power measurements at vhf-uhf
frequencies ... can be used as general-purpose tuned voltmeter ... Well shielded,
4-stage amplifier provides high gain, permitting detection of 5 μ v. AVC switch pro-
vides logarithmic response for null-type measurements. Insertion loss and attenua-
tion of coaxial cables, filters, attenuators, and other components can be accurately
measured — direct measurements to 80 db, or to over 100 db by using additional
pads.



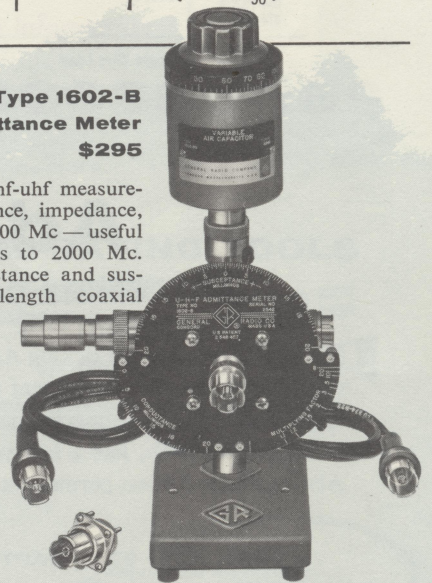
Type DNT-1 40 to 530 Mc.....	\$686
Type DNT-2 40 to 280 Mc.....	\$666
Type DNT-3 220 to 950 Mc.....	\$714
Type DNT-4 870 to 2030 Mc.....	\$919

Higher frequency operation up to 5000 Mc
using oscillator harmonics. Any DNT As-
sembly can be converted to any other by
changing local oscillators.

Type 1602-B Admittance Meter \$295

... Has no equal for vhf-uhf measure-
ments. Measures admittance, impedance,
and VSWR from 20 to 1500 Mc — useful
for matching impedances to 2000 Mc.
Direct reading in conductance and sus-
ceptance; with $\frac{1}{4}$ -wavelength coaxial
line between unknown
and instrument, scales
are direct reading in re-
sistance and reactance.

Unequalled speed of
measurement — move
two levers to obtain
null and answer ap-
pears directly on dial.
No sliding balance —
real and imaginary ad-
justments are independ-
ent of each other.



Impedance Range — with Type 874-
LK Line Stretcher, 1 to 5000 ohms
resistive, and ± 1 to ± 5000 ohms
reactive.

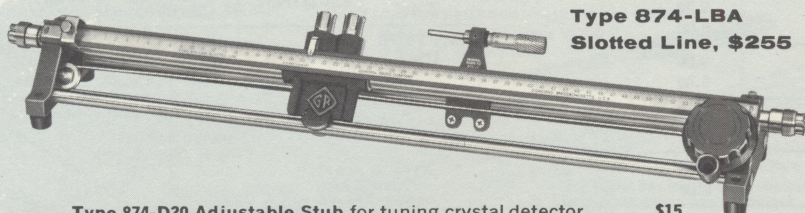
Admittance Range — conductance,
0.2 to 1000 millimhos; susceptance,
 ± 0.2 to ± 1000 millimhos.

VSWR Range — 1 to 10.

Accuracy — for both conductance
and susceptance at frequencies
to 1000 Mc (only slightly less accu-
rate to 1500 Mc).

$\pm (3\% + 0.2 \text{ millimho})$ to 20
millimhos
 $\pm (3\sqrt{M}\% + 0.2 \text{ millimho})$ from
20 to ∞ millimhos; "M" is scale
multiplying factor
... for matching, 3% accuracy to
2000 Mc.

Generator and Detector: G-R Unit Oscillators and DNT Detectors recommended.



**Type 874-LBA
Slotted Line, \$255**

For VSWR measurements from 150
to 5000 Mc ... a high-quality line at low cost
... Line and connectors introduce VSWR of less than 1.025 at 1000 Mc,
less than 1.07 at 4000 Mc ... Characteristic impedance is 50 Ω ...
Field sampled by electrostatic pick-up probe and detected by a
crystal diode mounted in probe carriage; probe penetration is com-
pletely adjustable.

Type 874-D20 Adjustable Stub for tuning crystal detector. \$15
Type 874-LV Micrometer Vernier for measuring high VSWR ratios. \$30

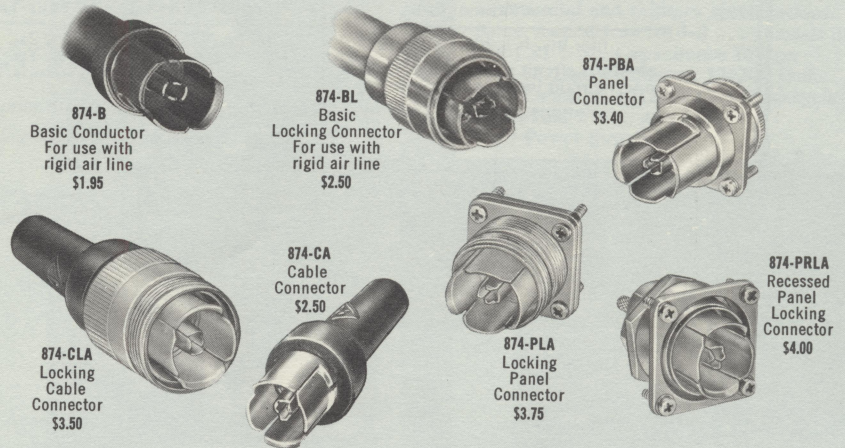


Coaxial Connectors

874 Connectors for use with these Cables:

Type	Fits Cable
874-B 874-BL	50-Ω rigid air line
874-CA 874-CLA 874-PBA 874-PLA 874-PRLA	General Radio Type 874-A2 Cable
874-C8A 874-CL8A 874-PB8A 874-PL8A 874-PRL8A	50-Ω Cables: RG-8A/U, -9B/U, 10A/U, -87A/U, -116/U, -156/U, -165/U, -166/U, -213/U, -214/U, -215/U, -225/U, -227/U Other Cables: RG-11A/U, -12A/U, -13A/U, -63B/U, -79B/U, -89/U, -144/U, -146/U, -149/U, -216/U.
874-C58A 874-CL58A 874-PB58A 874-PL58A 874-PRL58A	G-R Type 874-A3 cable, RG-29/U, -55/U series, -58/U series, -141A/U, -142A/U, -159/U, -223/U
874-C62A 874-CL62A 874-PB62A 874-PL62A 874-PRL62A	RG-59/U, -62/U series, -71B/U, -140/U, -210/U
874-PLT 874-PRLT	Single Wire Lead

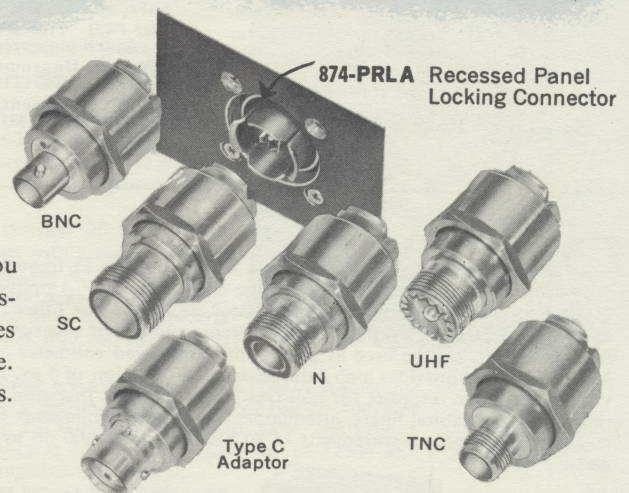
THE 874 FAMILY OF CONNECTORS



Quantity Prices Available

Adaptors to other connector systems

With the G-R line of Locking Adaptors plus a Recessed Panel Connector, you can quickly convert equipment to any of six different coaxial connector systems. The resulting connector can be permanent or readily changed, protrudes less than one inch, has a low-vswr contribution, and is trim in appearance. Also available for less permanent setups is G-R's line of Non-locking Adaptors.

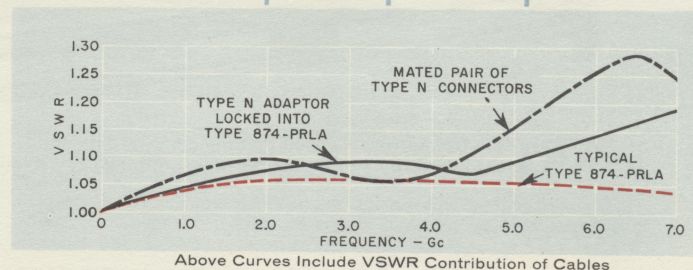


Type 874 ADAPTORS (NON-LOCKING TYPE)

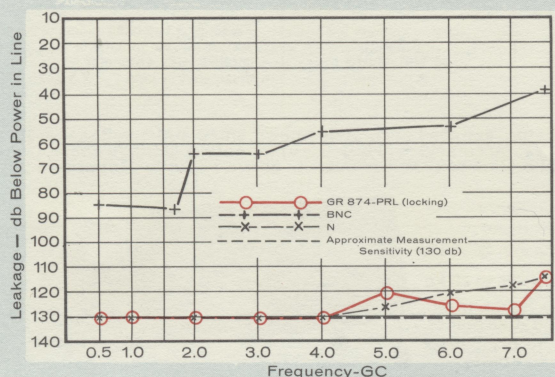
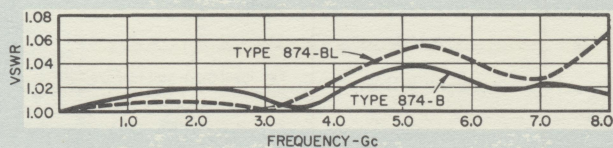
	TYPE	CONNECTS TYPE 874 TO...	LIST PRICE
	TO TYPE BNC	874-QBJA BNC Plug 874-QBPA BNC Jack	\$4.75 5.25
	TO TYPE C	874-QCJA C Plug 874-QCP C Jack	5.50 6.25
	TO TYPE HN	874-QHJA HN Plug 874-QHPA HN Jack	6.00 7.50
	TO TYPE LC	874-QLJA LC Plug 874-QLPA LC Jack	12.00 20.00
	TO TYPE LT	874-QLTJ LT Plug 874-QLTP LT Jack	20.00 25.00
	TO TYPE N	874-QNJA N Plug 874-QNP N Jack	5.00 5.00
	TO TYPE SC	874-QSCJ SC Plug (Sandia) 874-QSCP SC Jack (Sandia)	9.00 9.00
	TO TYPE TNC	874-QTNJ TNC Plug (Sandia) 874-QTNP TNC Jack (Sandia)	6.50 6.50
	TO TYPE UHF	874-QUJ UHF Plug 874-QUP UHF Jack	5.00 5.00
	TO RIGID LINE	874-QU1A 7/8-in. 50Ω UHF Rigid Line, RG-155/U (EIA TR-134) 874-QU2 1 1/8-in. 50Ω UHF Rigid Line, RG-153/U (EIA TR-134) 874-QU3A 3 1/8-in. 50Ω UHF Rigid Line, RG-154/U (EIA TR-134)	35.00 80.00 135.00

LOCKING ADAPTORS

	TYPE	CONNECTS TYPE 874 TO	LIST PRICE
TO TYPE BNC	874-QBJL	BNC Plug	\$5.75
TO TYPE C	874-QCJL	C Plug	6.50
TO TYPE N	874-QNJL	N Plug	6.00
TO TYPE SC	874-QSCJL	SC Plug (Sandia)	10.00
TO TYPE TNC	874-QTNJL	TNC Plug (Sandia)	7.50
TO TYPE UHF	874-QUJL	UHF Plug	6.00



The famous **G-R 874 Coaxial Connector** is now available in two versions, locking and non-locking. Both connector systems are compatible, and come in cable, panel, and rigid-line models.



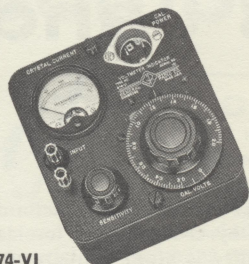
UNLIKE MOST CONNECTORS, THE G-R 874...

- ★ is hermaphroditic... identical connectors can be plugged together... eliminates searches for male and female components.
- ★ has extremely low vswr... typically less than 1.02 to 4 Gc; less than 1.06 to 7 Gc.
- ★ has low leakage; down at least 115 db for locking types at frequencies to 7 Gc.
- ★ is available in locking or non-locking types for semi-permanent or quick connect-disconnect setups.
- ★ forms a rigid, uniform 50-ohm section when connected; provides strong friction-grip contact through multiple-spring fingers.

Write for Complete Information

Coaxial Elements and Accessories

Many are available in both non-locking and locking versions.
Second price, if given, denotes cost of element with locking connectors.

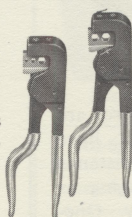


874-VI Voltmeter Indicator
used with either the 874-VQ or 874-VR, makes an accurate system for measuring voltages in coaxial systems. Range: 0.1 to 2 volts... Accuracy: ± 0.05 volt. Price: \$90.

874-TO8 and 874-TO58 Crimping Tools
(\$75 and \$85 respectively). For crimping ferrule which holds cable shield to connector. 874-TO8 is designed for use with 8-series connectors. 874-TO58 will handle the others.

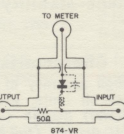


874-R22LA
3-ft. Cable with locking 874 Connectors
\$10.00



874-VQ Voltmeter Detector

a general-purpose detector of modulated or unmodulated signals in 50-ohm systems. Can be used as a matched detector with an 874-WM 50-ohm termination. VSWR less than 1.1 at 1000 Mc, less than 1.2 at 2000 Mc. Price: \$30; (L) \$32.



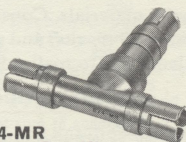
874-VR Voltmeter Rectifier

similar to 874-VQ, but has output impedance of 50 ohms. Can be used to convert any oscillator into a 50-ohm signal generator. Range: 15 Mc to 2500 Mc. Price: \$30; (L) \$32

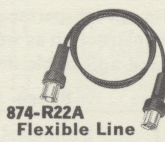


for assembling 874 Connectors in production.
Price is \$20 for set

874-TOK Tool Kit



874-MR Mixer Rectifier
for mixing signals between 50 and 5000 Mc to produce i-f signal below 40 Mc... Used in DNT Detector System... Price \$32.50; (L) \$34.50



874-R22A Flexible Line
3-ft. 874-A3 double-shielded cable with 874-C Connectors. \$9.50

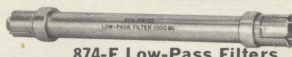


874-LR Radiating Line
enables coupling to field within line... \$12.00

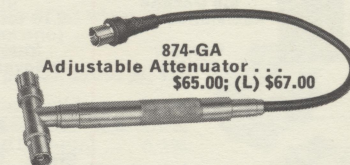
874-T Tee
for connecting elements in shunt with a coaxial line
\$13.00; (L) 14.00



874-EL
90 Degree Ell for right-angle bends... \$9.50; (L) \$10.50



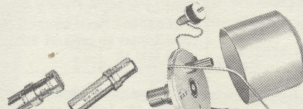
874-F Low-Pass Filters
cutoffs at 185 Mc, 500 Mc, 1000 Mc, 2000 Mc, 4000 Mc... \$22.00-\$30.00



874-GA Adjustable Attenuator... \$65.00; (L) \$67.00
... a precision-tooled, continuously adjustable Attenuator for producing accurately known voltage ratios, for adjusting voltage magnitude and for attenuation measurements with high precision.

Frequency Range: 100 to 4000 Mc
Attenuator Range: 120 db
VSWR Introduced into Line: less than 1.03 at 1000 Mc

Accuracy with Stub-Terminated Input: $\pm$ (1% of difference in Attenuation readings ± 0.2 db).

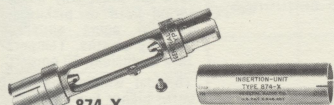


874-M Component Mount (L) \$28.50
shielded enclosure minimizes effects of lead reactance and stray capacitance in high-frequency impedance measurements of R-L-C components and combinations — useful from dc to 5000 Mc.

874-LK Constant-Impedance Adjustable Lines
for 10-cm and 22-cm travel... low VSWR and uniform 50-ohm impedance
\$40 each; (L) \$42 each



874-LT Trombone Constant-Impedance Line
varies line length 44 cm without physically moving either input or output... \$95.00 (L) \$97.00



874-X Insertion Unit... \$12.00
... a shielded enclosure, for "home-made" filters, attenuators, impedance-matching networks, vhf transformers and other components. Cylindrical space is 2" long by $\frac{1}{16}$ " diameter.

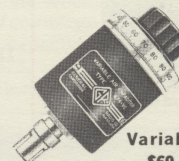
874-L Air Lines
10-cm, 20-cm, and 30-cm Air Lines with 874-B Connectors at each end... \$8.00-\$9.00



874-D Adjustable Stubs
with calibrated cm scale indicating position of termination; two models: 20-cm travel or 50-cm travel... \$15, \$18; (L) \$16, \$19



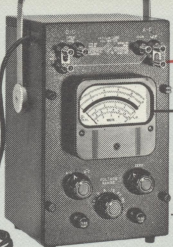
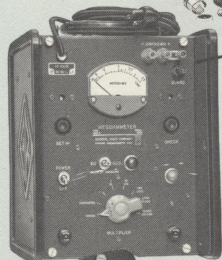
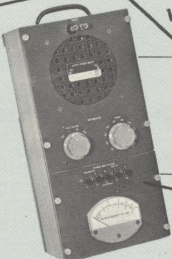
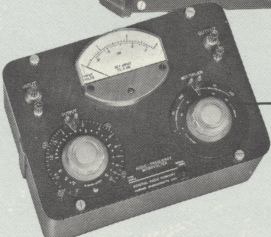
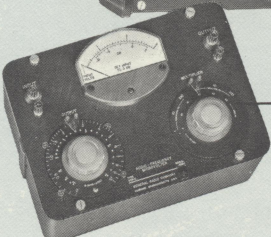
874-G 3-db, 6-db, 10-db, and 20-db Fixed Attenuators
have very low VSWR less than 1.1 to 1000 Mc, less than 1.3 to 4000 Mc... 1-watt power handling capacity (3000 watts, peak) ... \$36 for 3-db model, \$30 for others. Locking versions, \$32 and \$38.



874-VC Variable Capacitor... \$60.00; (L) \$61.00
a general-purpose tuning element for use at lower frequencies where adjustable stubs and lines are inconvenient because of their large physical sizes.

Features milled aluminum rotor and stator, high-temperature polystyrene insulation, precision ball bearings, accurately-engraved drum dial and well-shielded enclosure. Capacitance variation: 14 to 70 μ f below 50 Mc.

Meters

Instrument	Measures	Accuracy	Features
 1800-B Vacuum-Tube Voltmeter, \$490	0.1 to 150v, ac 0.01 to 150v, dc 6 ranges	±2% full scale ac or dc	Highest accuracy . . . measures to 1500v with accessory multipliers (extra cost) . . . high stability, one zero control for all ranges — eliminates resetting when switching scales . . . 25 M Ω input impedance; 1050Mc resonant frequency . . . measurements to at least 500Mc without need of special grounding devices, probe disassembly, or external capacitors.
 874-VR Voltmeter Rectifier, \$30 and 874-VI Voltmeter Indicator, \$90 (See page 11)	0.1 to 2v	±0.05v	For measuring voltages from 15 to 2500Mc and for converting oscillators into 50- Ω signal generators — built-in calibration circuit for crystal.
 1862-B Megohmmeter, \$255	0.5 M Ω to 2,000,000 M Ω	±3% to ±12% on 500v; ±5% to ±14% on 50v	For insulation- and leakage-resistance measurements . . . 2 test voltages, 50v or 500v . . . internal calibrating circuit, complete high-voltage protection, and convenient expanded meter scale.
 783-A Output-Power Meter, \$450	0.2 mw to 100 watts	±0.25 db at full scale	Rapid, direct-reading audio measurements . . . essentially an adjustable load impedance in parallel with voltmeter calibrated in watts dissipated in load . . . 2.5 to 20,000 Ω range.
 546-C Audio Microvolter, \$170	Used with oscillator, supplies accurately-known small audio voltages from 0.5 μ v to 1.0v open circuit . . . accuracy, ±(3% + 0.5 μ v) for output settings above 1 μ v from 20c to 20 kc; ±5% calibration to 100kc for outputs above 100 μ v . . . input and output impedances 600 Ω .		

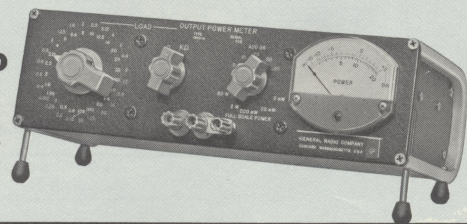
NEW 1840-A Output Power Meter . . . \$210

Power Range: 0.1mw to 20w in five decade ranges; auxiliary scale calibrated from -10 to 43 db (re 1mw).

Impedance Range: 48 steps approximately logarithmic from 0.6 Ω to 32k Ω .

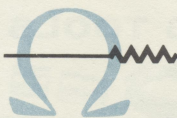
Accuracy: Db Error: ±0.5 db from 70c to 10 kc, does not exceed ±1.5 db at 20c and 20 kc points.

Impedance Error: ±5% from 70c to 10 kc, does not exceed ±50% at 20c and 20 kc points.



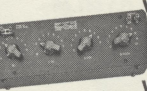
Page 12

R / L / C Standards and



RESISTANCE

Standards are individually adjusted to specified values . . . have low residual reactances due to use of flat resistance forms and unifilar or Aryton-Perry windings . . . preaging as needed at elevated temperatures insures excellent stability. One-hundred-percent inspection.

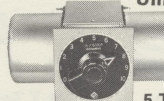
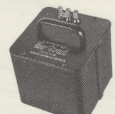
Type	Range	Characteristics
 510 Decade Resistance Units 9 types, \$14-\$35	In sizes from 0.1 Ω total to 1.0 M Ω total (one logarithmic model from 0.1 Ω to 100 k Ω in seven decade steps).	High accuracy of ±0.05% for all units, except 10 Ω (total) decade (±0.15%), 1 Ω decade (±0.5%), and 0.1 Ω decade (±2%). Useful as standards from dc to several hundred kc, or as precision components. Supplied with aluminum shield can, knob, and dial plate.
 1432 Decade Resistance Boxes 10 models, \$95-\$160	Boxes from 111 Ω to 1,111,100 Ω Total Resistance 0.01 Ω 111.1 Ω , 1,111.1 Ω 0.1 Ω 1,111 Ω , 11,111 Ω 1 Ω 11,110 Ω , 111,110 Ω 10 Ω 111,100 Ω , 1,111,100 Ω 100 Ω 1,111,000 Ω	Assemblies of Type 510 Units in metal shielded cabinets. Low zero resistance — less than 0.002 Ω per decade at dc, 0.04 Ω per decade at 1 Mc. Low temperature coefficient of ±0.002%/°C except for 0.1 Ω decade where box wiring has small effect.
 1450 Decade Attenuators 2 models, \$285, \$390	110-db total in 1-db steps and 111-db total in 0.1-db steps	For measurements of power level, transmission efficiency, gain or loss. Low-frequency error less than +0.006 db ±0.25% of dial reading for 1-db-per-step decade; less than +0.009 db ±0.25% for 0.1 db-per-step decade.
 1454-A Decade Voltage Divider, \$160 1454-AH Decade Voltage Divider, \$160	Provides voltage ratios from 0.0001 to 1.0000 in 0.0001 steps	Accuracy is 0.04% of ratio at input voltages below 120v. Negligible thermal emf. Particularly valuable for linearity measurements, meter calibration, and for determining voltage transmission ratios. Input constant 10k Ω for 1454-A, 100k Ω for 1454-AH for high-impedance load.
 500 Fixed Precision Resistors 18 types, \$6-\$27	10 Ω to 1 M Ω in 1-2-5 sequence; 1 Ω and 600 Ω also available.	±0.05% accuracy for all but 1 Ω unit (±0.15%). Sealed from moisture in phenolic case. . . banana plugs permit direct connection to standard 3/4"-spaced terminals.



INDUCTANCE

Highest performance is provided by G-R air-core toroidal inductors . . . stability is high, temperature coefficient is low. Since there is no variation of inductance with current, inductors such as the Type 1482 series can be considered ideal standards . . . they have proved stable over several years to better than 0.02%.

Higher inductance in a given volume is obtained with some sacrifice in stability through use of high-permeability core materials. Considerable economy in coil construction as well as higher Q results, and good secondary standards and adjustable decade elements are realized.

Type	Range	Characteristics
 940 Decade Inductor Units 5 Types, \$110-\$130	1 mh total, 0.1-mh steps 10 mh total, 1-mh steps 100 mh total, 10-mh steps 1 h total, 0.1-h steps 10 h total, 1-h steps	Assemblies of four toroids on molybdenum-permalloy dust cores, series connected by a rotary switch to produce eleven successive values from 0 to 10 . . . ±0.25% accuracy for 10 h unit to ±3% for 1 mh unit. For use in filters, equalizers and tuned circuits at audio and low rf.
 1490 Decade Inductors 3 models, \$450 \$360, \$460	1.111 h total, 0.1-mh steps 1.11 h total, 1-mh steps 11.11 h total, 1-mh steps	Shielded metal boxes with three or four Type 940 Decade Inductor Units for 2- or 3-terminal measurements.
 1482 Standard Inductors 17 types, \$110-\$225	Sizes from 50 μ h to 10h in 1-2-5 sequence	Primary standards with ±0.03% to ±0.1% certification. Symmetrically-wound toroid on ceramic core has practically no external field or pickup — thermal aging equalizes winding strains. Temperature coefficient, 30 ppm/°C.
 1481 Standard Inductors 16 types, \$37.50-\$50	100 μ h to 10h in 1-2-5 sequence	Toroidal winding on dust core; higher low-frequency Q than 1482 models . . . ±0.25% accuracy for larger units, ±2% for smaller.
 107 Variable Inductors 5 models, each \$110	Series connected: 9-50 μ h, 90-500 μ h, 0.9-5 mh, 9-50mh, 90-500 mh. When parallel connected, inductance range in each case is 1/4 that given above.	Concentrically-mounted rotor and stator may be connected in series or parallel for continuous adjustment of inductance over wide ranges. Basic accuracy is ±1%. Also usable as variable mutual inductance.

Amplifiers



1932-A Distortion and Noise Meter . . . \$725

highly regarded broadcast instrument, also widely used in communications labs and production testing for audio signal-to-noise measurements, for determining frequency-response characteristics and hum level . . . measures distortion as low as 0.1% on fundamental frequencies from 50 to 18,000 cycles . . . noise and hum measurements from 30 to 55,000 cycles.



1230-A D-C Amplifier and Electrometer . . \$460

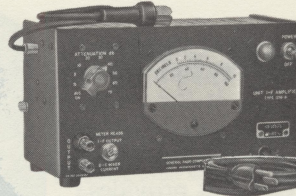
Voltage Ranges: ± 30 mv, 100 mv, 300 mv, 1 v, 3 v, and 10 v, dc, full scale. Accuracy is $\pm 4\%$ of full scale on 30 mv range, $\pm 2\%$ on all other ranges.

Current Ranges: ± 300 milli-microamperes dc (3×10^{-13} amp) full scale to ± 1 milliamperes full scale in twenty ranges (two per decade). Full-scale accuracy is $\pm 3\%$ to $\pm 10\%$ depending on multiplier position.

Resistance Ranges: 300 kilohms to 30 megamegohms ($3 \times 10^{13} \Omega$) in 16 ranges. Accuracy is $\pm 3\%$ to $\pm 10\%$ depending on multiplier and on meter deflection. Range extended considerably with external batteries; with 600v battery in place of internal 9v source highest resistance range is $10^{14} \Omega$ full scale ($1.2 \times 10^{17} \Omega$ at smallest meter division).

Milli-voltmeter, micro-microammeter, mega-megohmmeter, and d-c amplifier in one package. Switching arrangement allows you to change functions rapidly . . . from high-impedance voltmeter, to low-impedance ammeter, or to megohmmeter, without the need of accessory multipliers or shunts. Insulation-resistance measurements are easily performed at a variety of voltages, with aid of external d-c supply.

High sensitivity and excellent stability — drift is less than 2-mv per hour after one-hour warmup. Provision for either two-terminal or guarded measurements. Output jacks for driving graphic recorders with input resistances up to 1500 Ω are provided (5-ma recorders can be connected directly).



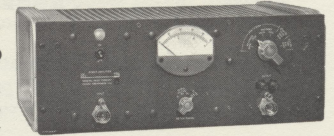
Type 1216-A Unit I-F Amplifier . . . \$360

(Incorporated in DNT Detector, see page 9)

A four-stage, high-gain, 30-Mc amplifier . . . bandwidth is 0.5 Mc between 3-db points . . . Sensitivity 2 μ v for 1% meter deflection from 400-ohm source . . . Attenuator range, 0-70 db in 10-db steps . . . output impedance is 600 ohms . . . maximum output is 2 volts open circuit . . . built-in power supply . . . AVC provided for null detection.

For a description of the 1232-A Tuned Amplifier and Null Detector, see page 7.

1233-A Power Amplifier . . . \$660



3 ranges: 20c-20kc, 15 watts over most of range; 20kc-1.5Mc, 15 watts to 0.5Mc, 8 watts above; 20c-3Mc, 150v balanced, peak-to-peak or 50v grounded — good transient response, 0.1 μ s rise time with negligible overshoot — less than 3% distortion on all ranges — output meter and many other features.

1206-B Unit Amplifier . . . \$90



single-ended, push-pull circuit with wide frequency range — 3 watts from 20c to 50kc, 1.5 watts from 10c to 100kc and 0.5 watt at 250kc — less than 1% harmonic distortion at 2 watts. Unit Power Supply required.

Components



CAPACITANCE

G-R Air Capacitors approach ideal circuit elements — they offer low temperature coefficient of capacitance, low loss, and a high degree of stability. Other G-R precision capacitors use silvered mica for high dielectric strength, low dielectric loss, and high dimensional stability. This is the best available dielectric material for alternating-current standard capacitors. Polystyrene, which is nearly invariant with frequency, is superior for use at dc; this material is used in those of the Type 980 Decade series which have non-inductive foil windings and are hermetically sealed.

Type	Range	Characteristics
980 Decade-Capacitor Units 3 Polystyrene types \$51-\$66 3 Silvered-Mica types \$50-\$165 3 Paper or molded mica \$34-\$44 2 additional units Polystyrene, \$57 = (1% + 2 pf) Mica, \$48 = (0.5% + 2 pf)	1.0 μ f total, in 0.1 μ f steps 0.1 μ f total, in 0.01 μ f steps 0.01 μ f total, in 0.001 μ f steps 0.001 μ f total, in 0.0001 μ f steps	High quality capacitors mounted on 11-point switch to give total capacitance variation of 10:1 in equal increments; knob and dial plate provided. Each unit aged for highest stability. Polystyrene units calibrated $\pm 1.0\%$; D < 0.0002. Silvered - mica calibrated $\pm 0.5\%$; D < 0.0003. Molded mica calibrated $\pm 1\%$; D < 0.001. Paper calibrated $\pm 1.5\%$; D < 0.005.
Decade-Capacitance Boxes 1419-A Polystyrene \$205 1419-B Polystyrene , \$262 1419-K Silvered Mica \$315 1419-M Paper & Molded Mica \$145	1419-A, K, M: 1.110 μ f total, in steps of 0.01 μ f. 1419-B: 1.1110 μ f total in steps of 0.0001 μ f	Three Type 980 Decade-Capacitor Units in metal cabinet.
1401 Standard Air Capacitor 4 types, \$50-\$58	100, 200, 500, 1000 pf	Highly-stable standards, each adjusted to $\pm (0.1\% + 0.1 \text{ pf})$ at 1 kc. Low-loss: D < 0.00001 for 1000 pf unit, < 0.0001 for 100 pf.
1403 Standard Air Capacitor (3 terminal) 6 types \$45-\$60	0.01, 0.1, 1.0, 10, 100 and 1000 pf	Units accurate to $\pm 0.1\%$ except 0.01 pf ($\pm 0.3\%$). D is 0.00001 for all units.
1409 Standard Capacitor 10 types, \$32-\$160	0.001 to 1.0 μ f $\pm 0.05\%$ in 1-2-5 sequence	$\pm 0.04\%$ calibration certificate provided . . . stability within $\pm 0.01\%$ per year is maintained by careful, controlled construction and aging. Cast aluminum case with combination binding-post and plug-type terminals for stacking.
505 Capacitors 12 types, \$7.50-\$65	100 pf to 0.5 μ f in 1-2-5 sequence	$\pm 0.5\%$ or $\pm 3 \text{ pf}$ whichever larger; preaged for added accuracy, D < 0.0003 for nine larger units to 0.0006 for smallest 100 pf unit; silvered mica, foil pile, and low-loss case used.

Variable Capacitors



TYPE 1422 PRECISION VARIABLE CAPACITANCE STANDARDS

Replace Type 722 line, offer better stability and higher accuracy. These air-capacitance standards approach the ideal circuit element. Backlash has been reduced to the point of negligible effect. Dial may be set to one part in 25,000. Each unit is mounted in a rigid cast aluminum frame and supported with very low loss polystyrene insulation.

2-Terminal Type	Range (pf)	Accuracy	3-Terminal Type	Range (pf)	Accuracy
1422-D, \$295	100 to 1150 35 to 115	$\pm 0.03\%$ or $\pm 0.6\text{pf}^*$ $\pm 0.03\%$ or $\pm 0.1\text{pf}^*$	1422-CB, \$275	50 to 1100	$\pm 0.03\%$ or $\pm 0.6\text{pf}^*$
1422-MD†, \$295	0 to 1050 0 to 105	$\pm 0.03\%$ or $\pm 0.6\text{pf}^*$ $\pm 0.03\%$ or $\pm 0.08\text{pf}^*$	1422-CC, \$300	5 to 110	$\pm 0.03\%$ or $\pm 0.15\text{pf}^*$
1422-ME†, \$295	0 to 105 0 to 10.5	$\pm 0.03\%$ or $\pm 0.08\text{pf}^*$ $\pm 0.03\%$ or $\pm 0.02\text{pf}^*$	1422-CD, \$300	0.5 to 11 0.5 to 1.1	$\pm 0.03\%$ or $\pm 0.04\text{pf}^*$ $\pm 0.03\%$ or $\pm 0.008\text{pf}^*$
1422-N, \$275 (For R-F Use)	100 to 1150	$\pm 0.03\%$ or $\pm 0.6\text{pf}^*$			

*Whichever is greater; correction chart supplied permits greater accuracy — higher accuracy may be obtained from precision calibration chart which is available at extra cost.

†Indicate Capacitance Removed (For bridge substitution measurement)

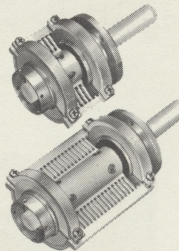
TYPE 1420 VARIABLE AIR CAPACITORS

3 models: 13-70 pf, \$30, 14-130 pf, \$32, 16-260 pf, \$33

Rotors and stators machined from solid aluminum extrusions for minimum inductance and resistance, maximum mechanical and thermal stability . . . 0.2% typical linearity, lowest dielectric loss . . . shock and vibration resistant — diameter 1 7/8".

1421 Variable Air Capacitors . . .

similar to 1420 series . . . larger units with 3 3/4" diameter.
 1421-J \$55 — 22 to 575 pf 1421-K \$58 — 29 to 1120 pf



NEW STANDARD POLYSTYRENE DECADE CAPACITOR



1 to 10 μ f Provides integral microfarad values from 1 to 10 with accuracy of 0.25% . . . minimum series inductance and resistance for use over broad frequency range . . . double shielding allows either two- or three-terminal connection with negligible difference in absolute capacitance.

Type 1424-A . . . \$325. Also available with impregnated paper dielectric . . . accuracy, $\pm 1\%$;

Type 1424-M . . . \$195.



NEW PRECISION DECADE CAPACITOR

100 pf to 1.111 μ f Increments of 100 pf to an accuracy of $\pm 0.05\%$. . . unique four dial in-line readout . . . uses four decades of G-R Type 505 (silvered mica) Capacitors (see table) . . . double shielding — for either two- or three-terminal use. **Type 1423-A . . . \$695**

Frequency Standards

Short-term and long-term stabilities comparable to the best crystal controlled standards available . . . at less than $\frac{2}{3}$ the price.

Outputs from 100c to 1000 Mc at decade intervals, plus 60c, 400c, and 5 Mc . . . more outputs than any other commercial unit provides.

1120-AH 1000-MC Frequency Standard

... \$6525 complete with rack and all interconnection provisions.

1103-B Synchronometer, \$975

Resolution is better than $\pm 0.2 \mu\text{sec}$ for time comparisons (consistent with stability of sky-wave signals from WWV and other stations).

1114-A Frequency Divider, \$950

INPUT: Either 5 Mc, 1 Mc, or 100 kc at 50 Ω , 1v $\approx$ 50%
OUTPUT: 1 volt at 5 Mc (with 5 Mc input), 1 Mc, 100 kc, 10 kc, 1 kc, 100 cps, (400 cps and 60 cps with optional plug-in units.) Square waves at 100 kc, 10 kc (7v p-p)
SPURIOUS SIGNALS: Better than 34 db down

1113-A Standard-Frequency Oscillator, \$1550

OUTPUT: 1v rms into 50 ohms at 5 Mc

STABILITY: Aging — Better than $\pm 5 \times 10^{-10}$ per day, averaged over 10 days, after 60 days of operation. After 1 year, average drift is less than 2×10^{-10} per day.

Short-term — Better than 1×10^{-10} per minute, measured with 1-second samples

Ambient — Less than $1 \times 10^{-10}/^{\circ}\text{C}$ (5×10^{-9} for 0-50 $^{\circ}\text{C}$)

Line — Less than 1×10^{-10} for 105-130 volts

1112-A Standard Frequency Multiplier (1, 10, 100 Mc), \$1450

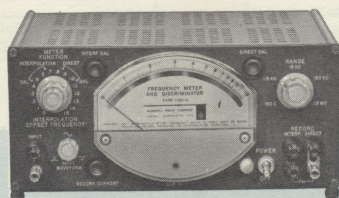
1-Mc, 10-Mc, and 100-Mc output frequencies at 20 mw generated by separate crystal oscillators that are phase-locked to input frequency (100 kc, 1 Mc, 2.5 Mc, or 5 Mc) . . . insures low f-m and a-m noise levels. Long-term stability dependent only on driving source. FM noise less than 1 part in 10^9 .

1112-B Standard Frequency Multiplier (1000 Mc), \$1360

Accepts 100-Mc input from 1112-A to produce 1000-Mc, 50-mw output. May be used with a distorting and mixing diode to produce harmonics for measurements well beyond X band. Long-term stability dependent only on driving source. FM noise less than 1 part in 10^9 .

1120-A 5-Mc Frequency Standard, \$3715

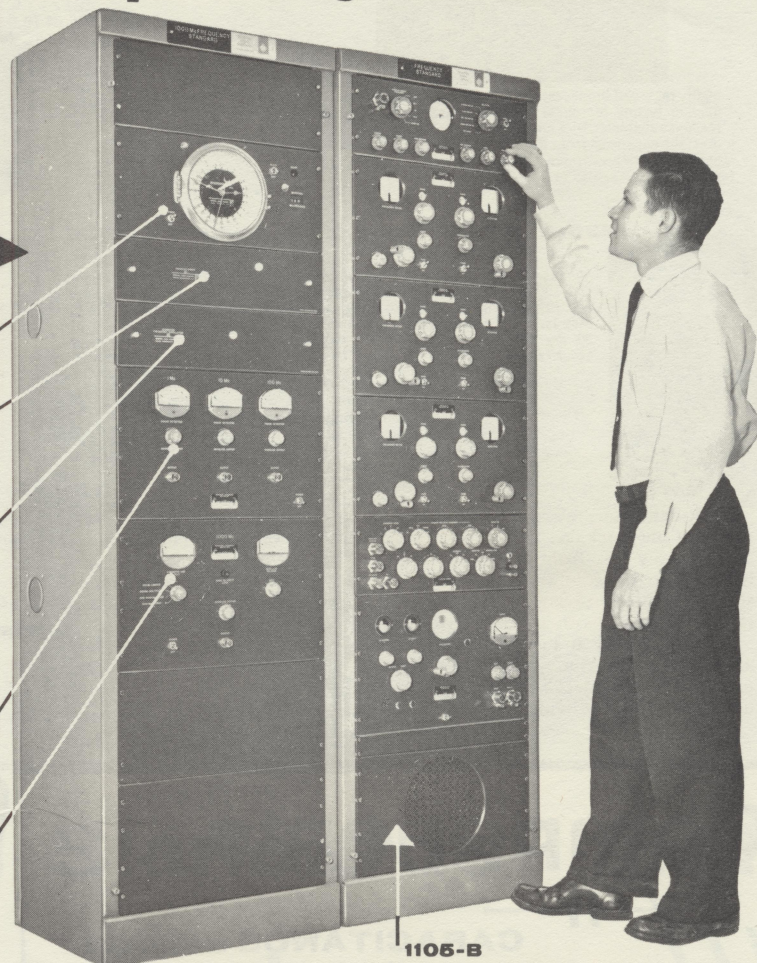
Consists of 1103-B, 1113-A, and 1114-A mounted in floor-type standard relay rack cabinet.



1114-A Frequency Meter and Discriminator

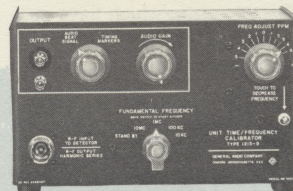
... \$525

3c to 1.5 Mc frequency range . . . $\pm 0.2\%$ accuracy . . . readings independent of input waveform . . . interpolator feature permits readings to 3 significant figures . . . linear pulse-count discriminator for deviation and incidental fm measurements . . . residual fm more than 100 db below full output . . . output for recorder.



1105-B Frequency Measuring Equipment . . . \$5900

Consists of: Comparison Oscilloscope, three Frequency-Transfer Units, Interpolation Oscillator, and Coupling Panel for centralized control of all units. Measuring accuracy better than 2 parts in 100 million when used with the 1120 Frequency Standard.



1213-D Unit Time/Frequency Calibrator . . . \$310

Inexpensive and compact secondary frequency standard . . . provides 10-kc, 100-kc, 1-Mc, and 10-Mc fundamentals with harmonics up to 1000 Mc . . . useful for general-purpose frequency measurements, or as a timing

source for scope calibration (differentiator provided for this purpose). Short-term accuracy after standardization is 2 parts in 10^7 .



NEW

1150-A

Digital Frequency Meter . . . \$915

A low-cost, general-purpose digital counter for measuring frequencies, random events, and for industrial counting applications. The counter can be started, stopped, and cleared manually or by external signals.

Frequency Range: 10 cps to 220 kc

Accuracy: ± 1 count = time-base stability

Time-Base: Internal 100-kc crystal oscillator with $\frac{1}{2}$ ppm stability. Provision for external 100-kc time base

Sensitivity: Better than 1 volt, peak-to-peak. For pulses, duty ratio should be between 0.2 and 0.8. Input impedance is 0.5 M Ω shunted by less than 100 pf

Gate Times: 0.1, 1, and 10 seconds. Also manual start/stop

Reset: Automatic or manual

Display Time: Adjustable from 0.1 to 5 seconds, or infinite

Self Check: Has provision for counting own 100-kc frequency

Small Size: Only $3\frac{1}{2}'' \times 19'' \times 10''$

NUMERIK* Indicator

Numerals are — Large • Bright

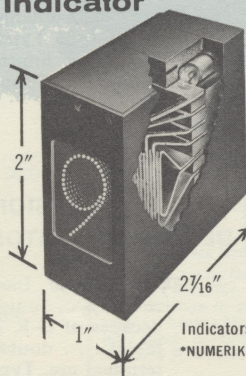
Always In Focus Always Operating

NUMERIK IN-LINE READ-OUT — a new type of indicator activated by standard incandescent lamps, and displaying easily read 0.8-inch numerals.

The Numerik Indicator requires only one-third the volume and consumes one-half the power of comparable projection-type read-outs.

Quantity	Type IND-0300 zero through nine	Type IND-1801 zero through nine, comma and period
1 - 19	32.20	33.60
20 - 49	30.60	32.00
50 - 99	28.60	30.00
100 - 299	27.20	28.60

Discounts for larger quantities available.



Indicators with letters and other symbols available on special order — Please inquire.

*NUMERIK is a Trade Mark

and Digital Equipment



The Counter with a Memory

The 1130-A Digital Time and Frequency Meter measures frequency, period, ten-period, time-interval, frequency ratios, pulse durations, and events without special plug-in units. With the turn of a switch this instrument can be converted from one with conventional intermittent display to one that is continuously counting and indicating. In the "Continuous" mode, four of the instrument's eight decades hold a count and display it continuously, while the remaining four decades are simultaneously counting.

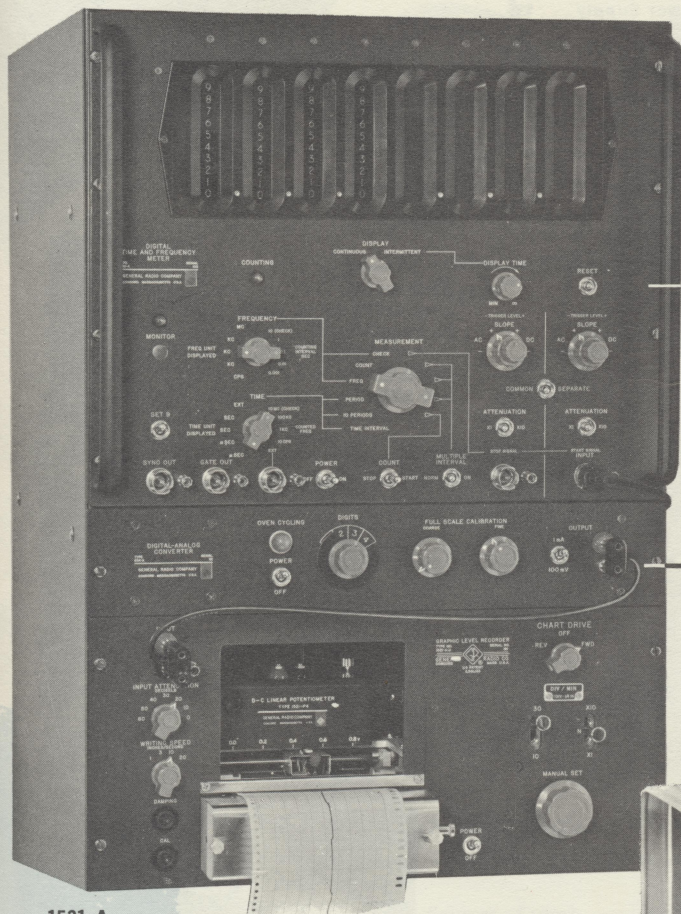
This instrument uses a decade code and counting circuits that are inherently reliable. Counting circuits are practically unaffected by changes in tube characteristics, and do not require fussy, regulated plate and heater power supplies. This counter will not "go soft" or give erroneous readings without warning. Circuits operate properly under

the worst possible combination of cumulative tolerances imposed by tubes, component values, and voltage levels. This counter will perform properly even when its tubes approach the half-dead state.

Information-acquisition efficiency is as high as 83%; you wait only 2/10 of a counting interval before a new measurement begins, irrespective of whether 8 or 4 digits are being displayed.

Input trigger-level, slope, and attenuator controls permit triggering at selected point on signal waveform, and aid in reducing the effects of noise.

Simplified graphic recording . . . Data held by internal storage circuits is ready-made for conversion to dc for all-electronic analog recording at low cost.



1130-A Digital Time and Frequency Meter

Measurement Ranges:

Frequency: dc to 10 Mc
Period: 10 μ sec to 107 sec
Time Interval: 1 μ sec to 107 sec
Also measures 10 periods, frequency ratios, phase shifts, pulse characteristics, and counts random events.

Display:

8 digits intermittent; 4 digits continuous readout (previous count displayed continuously during counting interval;

changes to new value when count is completed).

Sensitivity: 0.25v rms

Accuracy: ± 1 count $\pm$ time-base stability. A variety of plug-in time-base generators are available with short-term stabilities ranging from 1 part in 10⁸/min to 1 part in 10⁹/min.

Price: From \$2,585 to \$2,950 depending on time-base generator desired.

1134-A Digital-to-Analog Converter \$595

High Accuracy —

Linearity: $\pm 0.05\%$ of full scale
Stability: $\pm 0.02\%$ for $\pm 15\%$ line voltage variations; $\pm 0.03\%$ for ambient temperature changes over the range from 0 to 50 C.

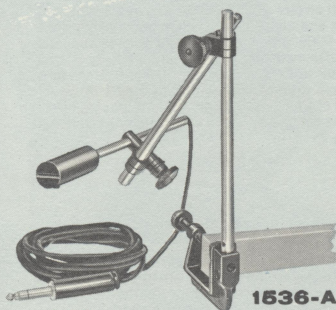
• All Electronic — No mechanical data printer required to convert counter output to steady analog signal. Operates directly from the G-R Counter's

internal storage system.

• Either 1 ma or 100 mv output. Connects readily to most d-c strip-chart recorders.

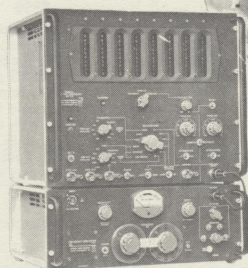
• Records first 3, last 3, or last 2 digits of the G-R Counter's 4-digit continuous display which may be set to read any four consecutive digits of count over the range from dc to 10 Mc.

1521-A
Graphic Level Recorder
(see page 16)



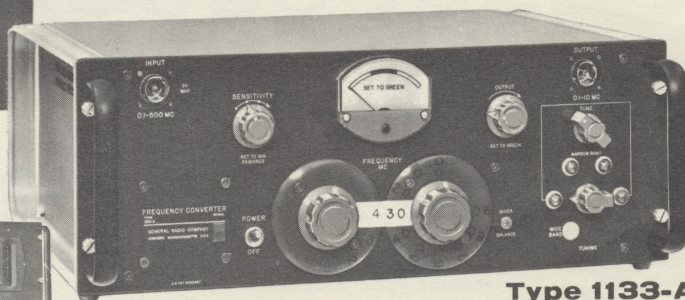
NEW 1536-A
Photoelectric Pickoff . . . \$65

Consists of an adjustable linkage system, a light source, an optical system, and photocell. Useful accessory for totalizing and speed measuring applications with the 1150-A Counter. Connection provisions are available on the Counter.



1132-A Data Printer
... \$1550

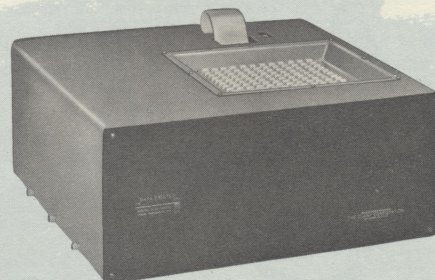
Provides permanent printed records on adding machine tape. The printer has a 12-column register capacity, eight of which are used to print counter output. The remaining four columns can be used to display additional data such as time from a digital clock. Printing rate is adjustable from one print every twenty seconds to three prints per second. A keyboard and print-command bar allow numbers to be typed manually between automatic prints.



NEW

Type 1133-A
Frequency Converter and Video Amplifier . . . \$1250

- Extends range of 1130-A Counter to 500 Mc.
- 10- to 20-mv sensitivity over entire range
- Narrow-band mode available for frequency measurements in the presence of noise
- 50-ohm input impedance



An output for driving an IBM summary punch is available as a special option.

Sound and Vibration



Type 1551-C Sound-Level Meter

...Small, Lightweight, Easy to Handle...\$425

Basic instrument in G-R line of sound measuring equipment. Meets all specifications of the American Standards Association. Range is 24 to 150 db above 0.0002 μ bar with better than 1-db accuracy. Completely self-contained calibration circuit (no 115-volt line needed). A new sensitivity adjustment, calibrated directly in terms of microphone sensitivity, makes for convenient use of accessory microphones for specialized measurements. Uses new ceramic microphone that withstands temperatures from -30° to 95°C and humidities to 100%.

Type 1262-B Power Supply . . . \$95
Converts Sound-Level Meter from battery to a-c operation.



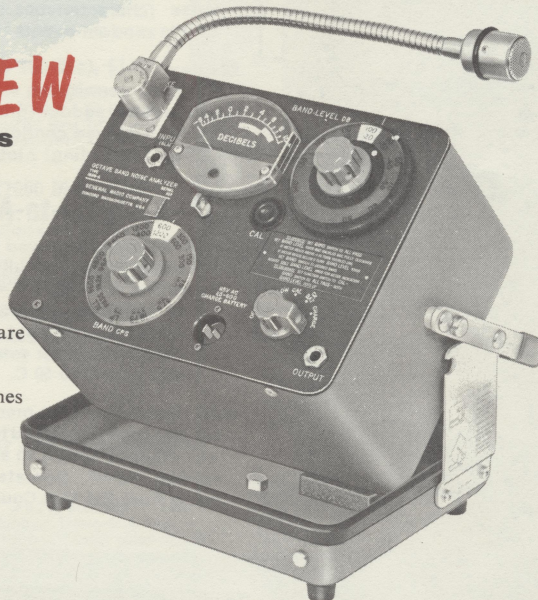
1551-A Sound-Survey Meter . . . \$175

pocket-size, battery-operated instrument for rapid and reliable surveying of sound and noise levels — ideal for consulting, industrial and safety work. The Sound-Survey Meter is smaller, lighter and less costly than the very flexible, highly accurate Type 1551-B.

NEW

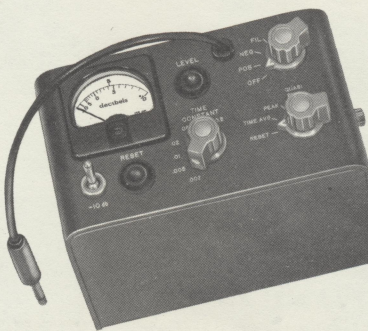
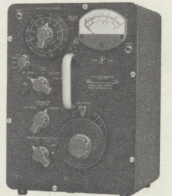
1558 Octave-Band Noise Analyzers ...\$725

Two models available: the 1558-A, whose frequency bands are centered on frequencies specified by ASA Standard Z24.10-1953; and the 1558-AP, where center frequencies are specified by ASA Standard S1.6-1960, as well as ISO Recommendation 402 and DIN Standard 45-401. Both instruments are essentially identical . . . they are small, portable, use rechargeable batteries, and are transistorized. Both measure levels in 10 octave bands, two lower and one higher than those specified in ASA Standards. The 1558 can be used directly with microphones for measuring levels above 44 db (accessory 1560-P4 Microphone Assembly, \$80).



1554-A Sound and Vibration Analyzer . . . \$1060

For the measurement of amplitudes and frequencies of sounds and vibrations. Designed for use with the 1551-C Sound-Level Meter or 1553-A Vibration Meter. May be used directly with microphones or vibration pickups when component levels exceed 50 db. The Analyzer is continuously tunable from 2.5c to 25 kc and has three bandwidths: "Narrow" . . . bandwidth is 8% of center frequency at 3-db points; "One-Third Octave" . . . bandwidth is 1.26:1 at 3-db points; and "All-Pass" . . . flat from 2.5c to 25 kc. Analyzer is battery-operated for field use and can be used with the 1521-A Recorder for automatic spectrum analysis (see page 3).

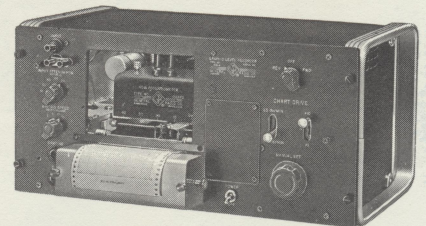


TYPE 1556-B Impact-Noise Analyzer . . . \$220

This instrument operates from the 1551-C Sound-Level Meter. Transients produced by the impact are picked up by the Sound-Level Meter microphone, strengthened by this instrument's amplifier, and passed on to the Impact-Noise Analyzer for measurement. Metering circuits drive a common panel meter to measure three characteristics from which both the level and duration of any impact noise can be determined. An electrical storage system makes it possible to measure in sequence all three of these characteristics for any signal impact.

1521-A Graphic Level Recorder \$995

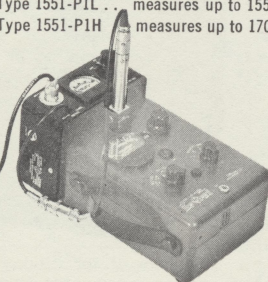
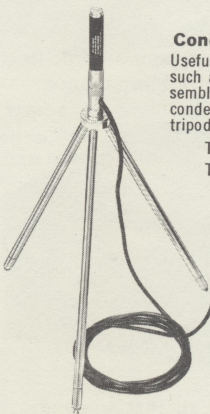
Plots linearly in db on 4-inch chart paper the rms level of a-c voltages from 20c to 200 kc. Ideal for plotting the responses of electro-acoustical devices as a function of frequency. Can be coupled to oscillators and analyzers for automatic plotting (see page 3). Recorder range is 40 db full scale with plug-in potentiometer supplied (20-db, 80-db, and d-c potentiometers also available). Recorder sensitivity is 1mv (0-db point) and can be varied from 1mv to 1v in 6 steps with input attenuator. Writing speed is 20 in/sec with 40-db pot (200 db/sec) with less than 1-db overshoot. Slower speeds (1, 3, or 10 in/sec) can be selected by switch to provide filtering of rapidly varying levels. Four paper speeds: 2.5, 7.5, 25 and 75 in/min (Optional model available with speeds from 2.5 to 75 in/hr).



Condenser-Microphone Assemblies

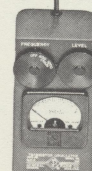
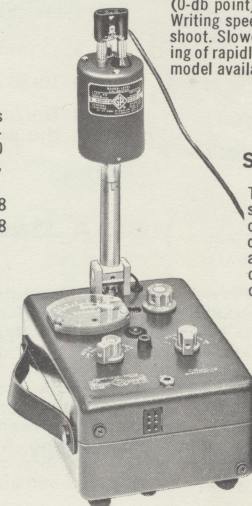
Useful for measuring high-intensity, high-frequency sounds such as gear noise or jet-engine and turbine sounds. Assembly consists of Altec-Lansing 21-BR-150 or 21-BR-180 condenser, microphone, pre-amplifier and power supply, tripod, cable, and carrying case.

Type 1551-P1L . . . measures up to 155 db . . . \$398
Type 1551-P1H . . . measures up to 170 db . . . \$398



Sound-Level Calibrator . . . \$52.50

The 1552-B Sound-Level Calibrator is a convenient accessory for making acoustical checks on the over-all sensitivity of a sound-level meter, including microphone (whether ceramic, crystal, dynamic, or condenser) and circuitry operating as a unit. The 1307-A Transistor Oscillator is especially designed for use with the Calibrator and serves as both the oscillator and input voltmeter in calibrations.



Measuring Equipment



Vibration Pickup Assembly ... \$140

The 1560-P11 Vibration Pickup Assembly extends the usefulness of the Sound-Level Meter for industrial vibration measurements. It converts the Sound-Level Meter to an excellent vibration meter for vibratory measurements from 20 cycles to 1200 cycles. Sensitivity is 40 mv/g. The assembly consists of a Vibration Pickup and Control Box. By means of integrating networks in the Control Box, voltages proportional to a vibrating-body's velocity or displacement are delivered to the input of the Sound-Level Meter. The system can measure accelerations as small as 0.3 in./sec² or 0.0008g, velocities down to 3000 μ in/sec, and displacements of 100 μ in. Maximum measurable acceleration before non-linearity occurs is 39,000 in./sec² or 100g.

New Vibration Calibrator ... \$225

The 1557-A Vibration Calibrator provides simple, accurate, and rapid calibration of vibration pickups. This battery-operated instrument makes possible single-frequency calibration of a wide variety of accelerometers ranging in mass up to 300 grams. G-R Types 1560-P51, 759-P35 and 761-P1 Vibration Pickups may be easily calibrated with this instrument as well as accelerometers of other manufacture.

Operating Frequency: 100 cycles
Output: 1 g rms $\pm$ 10%
Allowable Pickup Mass: Up to 300 grams



NEW

1553-A Vibration Meter ... \$675

Basically, the Vibration Meter is a vtvm specifically designed to amplify and measure the outputs from a wide variety of vibration pickups. The pickup delivers a voltage proportional to the acceleration of the vibrating body. Integrating networks, controlled by a panel switch, convert the pickup's output to a voltage proportional to either velocity or displacement.

A differentiating network converts the pickup's output to a voltage proportional to time rate of change of acceleration (jerk), which no other instrument can do.

Readings may be made in terms of *true* peak-to-peak (the first vibration meter which will measure this characteristic), peak, or average.

Measures:	Range† (Peak-to-Peak)	Frequency*
Jerk	30-300,000 in./sec ³	2-20 cps
Acceleration	0.3-300,000 in./sec ²	2-1200 cps
Velocity	0.03-30,000 in./sec.	2-1200 cps
Displacement	0.003-300 in. 0.00003-30 in.	2-1200 cps 20-1200 cps

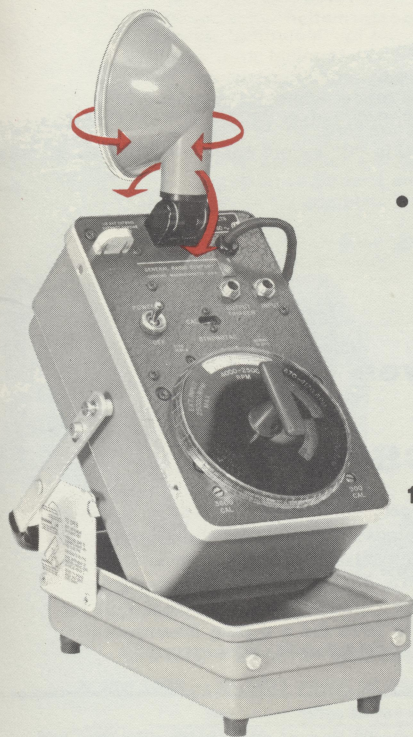
*with Type 1560-P51 pickup supplied; measurements possible to 20 kc with other accelerometers.

†Also available with calibration in metric system.

Stroboscopes

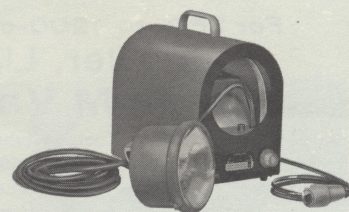
- To Help Engineer New Products
- To Improve Manufacturing Operations
- For Production Testing and Maintenance

Sources of short, precisely-timed light flashes for investigating the behavior of all types of repetitive or cyclic mechanisms. Speeds of moving objects can be accurately measured by "freezing" motion with these controlled sources of flashing light — or, the objects can be made to operate in apparent slow motion to permit detailed studies of operating behavior. There's a use for a G-R Stroboscope wherever there's a moving part or mechanism to be studied.



1531-A STROBOTAC® ... \$275

Versatile, basic, white-light stroboscope that is at least 70 times brighter than older model. New long-throw, narrow-beam light reaches into innards of operating equipment. Flash duration only one to six millionths of a second — freezes rapidly rotating objects (practically no blur) permitting observation of fine details impossible to see with other stroboscopes. 110 to 25,000 rpm direct reading range accurate to $\pm$ 1% ... useful up to 250,000 rpm using multiple image techniques. Unit is completely self-contained and operates from 115-v, a-c power.

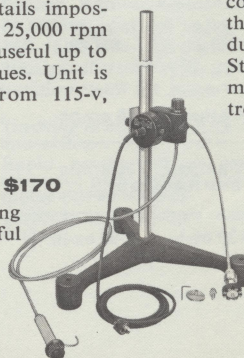


1532-D Strobolume ... \$315

Auxiliary white-light flash source for use with the Strobotac where a wide-angle beam is required. Flashing rate up to 1200 per minute, or up to 3000 per minute at reduced intensity. Light is considerably brighter on high-intensity position than Strobotac (approximately the same on reduced intensity position). Flash controlled by Strobotac, Contactor, or other make-break mechanisms. Push button provides manual control for single-flash photography.

1535-B Contactor ... \$170

A control and coupling device for synchronizing a stroboscope with a rotating shaft, so that motion can be observed as a function of shaft angle. Also useful for synchronizing stroboscopes with non-repetitive or erratic motion.



Variac®

Continuously Adjustable
AUTOTRANSFORMERS

for Smooth Control of AC Voltage

Variacs can be set to any output voltage from 0 to 17% above line voltage. Regulation is excellent, and losses are low under all load conditions.

The patented* *Duratrak* brush-track surface, found only on G-R Variacs, insures longer life, higher ratings per unit size, and minimum maintenance. Variacs with *Duratrak* can withstand momentary surges 10 times rated current without damage — *Duratrak* makes the Variac as reliable as a fixed-ratio transformer.

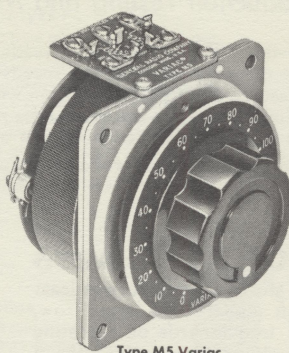
Variacs can be used singly, ganged for higher power, or in polyphase connections. They are available in portable packages or with industrial-type cases for panel, behind-panel, wall, or table mounting . . . ball-bearing and motor-driven Variacs are available for servo or remote-positioning applications . . . high-frequency models for airborne and military use . . . models on special order to meet your particular needs, at attractive prices where quantities are sufficient to warrant special production.



*DURATRAK CONTACT SURFACE PATENT NO. 2949592

For 350- to 1200-cycle service Smaller, Lighter Type M Variacs

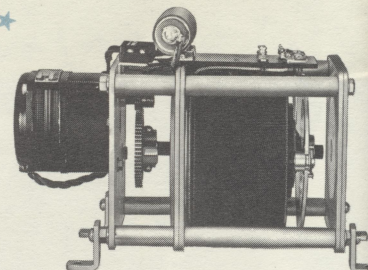
☆ Meet military shock, vibration, tropicalization, corrosion and salt spray specifications. ☆ Can be supplied with motor drives and ball bearings; no significant brush track wear after one million cycles. ☆ Good resolution for computing and control applications. ☆ Has high and low temperature lubrication, iridized aluminum parts, fungicidal treatment. ☆ Mechanically rugged. ☆ Available in single or ganged units. ☆ 320° angle of rotation.



Type M5 Variac

TYPE	M2 \$14.50	M5 \$18.50	M10 \$30.00	M20 \$48.00
Rated Current	2.4 amps	6 amps	10 amps	20 amps
Maximum Current	3.1 amps	7.8 amps	13 amps	26 amps
	on line-voltage connection			
Driving Torque	5-10 oz-in	10-20 oz-in	15-30 oz-in	45-90 oz-in

Motor Drives for Variacs



Servo-type motors with very low inertia are used to provide a wide variety of driving speeds . . . for single or ganged combinations. Full-traverse rates available: 2 and 4 seconds for high-speed servo use; and 8, 16, 32, 64, and 128 seconds for servo or remote positioning applications. Prices vary from \$103 for a 2-ampere single unit to \$910 for a 6-gang 50-ampere-per-section unit in quantities of 5 or more.

Ball-Bearing Models — W- and M-model Variacs can be supplied with ball-bearings for applications requiring low and constant torque. Ball-bearings are standard on all ganged units of four or more Variacs. The following surcharges apply for all ganged models having three or less Variacs.

	M2 W2	M5 W5	M10 W10	M20 W20	W30	W50
Single unit	\$ 6	\$ 7	\$ 8	\$10	\$13	\$17
Two-gang	\$ 8	\$10	\$11	\$12	\$16	\$22
Three-gang	\$11	\$12	\$13	\$14	\$20	\$27

Some of the More Popular
50-60 cycle units of the Variac Line.
Write for Variac Catalog "P".

Type	— AMPERES —		*Mntg.	Price
	Rated	Max.		
W2 W2M W2MT3	2.4 2.0	3.1 2.6	A B C D	\$ 15 \$ 21 \$ 26 \$ 28
W5 W5L W5M W5MT W5MT3	6.0 8.5 5.0	7.8 11 6.5	A A B C C D	\$ 18 \$ 17.50 \$ 24 \$ 30 \$ 32.50
W10 W10M W10MT W10MT3	10	13	A B C D	\$ 31 \$ 44 \$ 51 \$ 53.50
W20 W20M W20MT3	20 20 20	26 26 20	A B D	\$ 48 \$ 61 \$ 90
W30 W30M	30 28	36 32	A B	\$ 75 \$ 97
W50 W50M	50 40	50 45	A B	\$120 \$145
W5H W5HM W5HMT	2.0	2.6	A B C	\$ 21.50 \$ 27.50 \$ 33.50
W10H W10HM W10HMT	4.0	5.2	A B C	\$ 33 \$ 46 \$ 53
W20H W20HM W20HMT3	8.0 8.0 8.0	10.4 10.4 8.0	A B C	\$ 50 \$ 63 \$ 92
W30H W30HM	12 12	15.6 15.6	A B	\$ 75 \$ 97
W50H W50HM	25 20	32.5 31	A B	\$120 \$145

All "MT" models are shipped ready for over-voltage operation, providing a maximum output voltage of 17% above input line voltage, at rated current. If Variacs with "0 to line voltage" connections and dials are required, please specify when ordering.

†Does not have over-voltage feature.

*Mounting Information — Please order by TYPE NUMBER, not by "Mounting" designation.

A. Uncased with terminal strip.

B. Cased, with conduit knockouts.

C. Portable model — protective case, with carrying handle, overload protector, line switch, a-c outlet and line cord.

D. Identical to "C" except has 3-wire power cord and outlet.

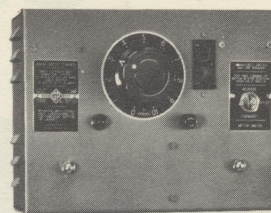
Variac[®] MOTOR SPEED CONTROLS

Variable-speed operation of d-c motors from a-c lines . . . combine the convenience of a-c power with excellent starting and good regulation characteristics of d-c shunt and compound-wound motors.

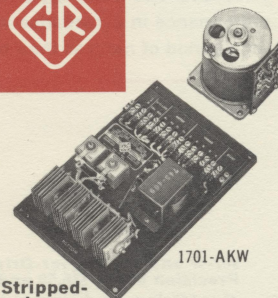
Ten models are available with ratings from 1/15 hp to 3/4 hp. Compact cabinet models make for neat appearance . . . may be mounted on bench, wall, shelf, or assembled as an integral part of any machine. Low-cost, stripped-down units are available for those who wish to build these Controls into their own equipment.

7 Outstanding Features

1. Variac Motor Speed Controls allow maximum motor performance — motor delivers rated torque at all speeds from rated to stalling.
2. No pulsating at any speed. This is important for precision machine operations such as grinding and lapping.
3. Extra quick start-stop-reverse under any load conditions.
4. No electron tubes: instant warm up; selenium rectifiers make for ruggedness and reliability.
5. Good regulation allows **smooth, slow starting** of machines performing critical processes.
6. Motor can be stopped or reversed at any speed with one switch. Dynamic braking is a standard feature on all controls above 1/15 hp.
7. Longer life. Minimum maintenance. Built-in over-load protection prevents motor burnout.



1700-B



1701-AKW



1701-AK

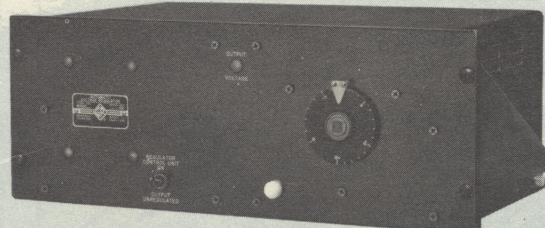
	Speed Range	Complete Model	Stripped-down Model
for shunt motors 1/15 hp or less	0-rated 0-2 x rated	1701-AK \$95	1701-AKW \$72
for shunt motors 1/15 hp or less	0-rated	1701-AM \$95	—
for series or universal motors 1/15 hp or less	0-rated	1701-AU \$95	—
for shunt or compound motors 1/12 hp to 1/6 hp	0-rated 0-1.25 x rated 0-1.5 x rated	1703-A \$110	1703-BW \$90
for shunt or compound motors 1/4 hp to 1/3 hp	0-rated 0-1.15 x rated	1700-B \$180	1700-CW \$155
for shunt or compound motors 1/2 and 3/4 hp	0-rated 0-1.15 x rated	1702-A \$255	1702-BW \$215

Motors available

Quantity discounts apply

Type 1570-A Automatic Line Voltage Regulator

High Accuracy for Laboratory Uses
6-KVA Power Capacity for Industrial Applications



- ★ holds output constant to $\pm 0.25\%$
- ★ fast response, 10v per second
- ★ absolutely no waveform distortion

MILITARIZED VERSION

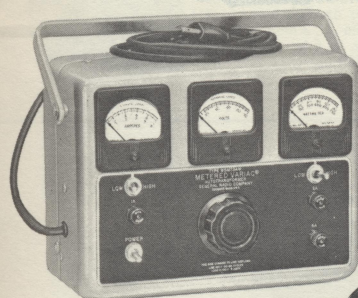
of the Automatic Voltage Regulator, the Type 1570-ALS15, has separate control and regulator units. Meets requirements of specification MIL-E-4158B and MIL-E-16400C. Price: \$705.

1570-AS25 Militarized unit, for control of balanced 3-phase line . . . 3-KVA capacity per phase for correction of $\pm 10\%$ input variations. Price: \$955.

Also available: a regulator for the control of 150-500 cycle lines (control unit requires 50- or 60-cycle power). Write for complete information.

Servomechanism type operation — sensing circuit samples output voltage, providing error voltage to change position of built-in Variac which in turn feeds step-down transformer. True proportional control rather than off-on operation provides smooth control with no dead zone. Output voltage is adjustable $\pm 10\%$. Handles input voltage variations of $\pm 10\%$. Can also be connected to handle $\pm 20\%$ voltage variations for loads to 3 KVA (accuracy $\pm 0.5\%$). Short period over-load rating is up to 10 times steady-state rating.

- 115v, 60-cycle models for bench, rack, or wall mounting, \$530;
- 230v models, \$530
- 3 units may be used to regulate legs of a 3-phase circuit
- 50-cycle models also available.



W5MT3AW
five-ampere model with voltmeter, ammeter, and wattmeter.



W10MT3A
voltmeter-ammeter combination

Compact-Portable Metered Variacs

6 Models — 0-140 volts at currents up to 10 amperes

Type	Voltage Ranges	Current Ranges	Wattage Ranges	Price
W5MT3VM	0-150	—	—	\$ 54
W5MT3A	0-150	0-1, 0-5	—	\$ 89
W5MT3W	0-150	—	0-150 0-750	\$112
W5MT3AW	0-150	0-1 0-5	0-150 0-750	\$150
W10MT3A	0-150	0-2 0-10	—	\$110
W10MT3W	0-150	—	0-300 0-1500	\$138

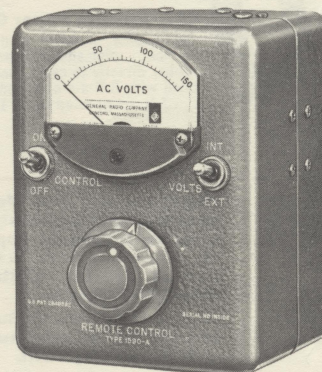
5-Amp Models

10-Amp Models

Type 1590-A Remote Control

for Remote Positioning of Motor-Driven Variacs

. . . A simple, reliable, and accurate servomechanism for controlling a motor-driven Variac[®] autotransformer. Remote Control setting can be adjusted for any voltage from 0 to 140 volts; the remote, motor-driven autotransformer will automatically position itself for same voltage.



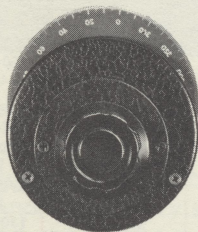
- ★ Tracking accuracy is $\pm 2\%$ of input line voltage.
- ★ Rapid positioning — eliminates manual, push-button control of motor-driven Variacs.
- ★ Controls any 120-volt motor-driven Variac.
- ★ Panel Meter reads both controlling voltage and load voltages.
- ★ If Control Unit is supplied with regulated line voltage, servo circuit will hold remote Variac at selected voltage despite line voltage variations at remote site.

Each General Radio product is backed by a comprehensive warranty, certifying its performance in accordance with specifications for a period of not less than two years.

Small Parts



907-W and 908-W Gear-Driven Precision Dials, \$10.50 and \$15.50, 4" and 6" diameters, front or back of panel . . . settings with precision of 0.06% full scale; parallax eliminated by indicator that always remains flush with dial surface . . . black enamel finish . . . see page 3 for 907, 908 Automatic Drives for these Dials.



Type KN Knobs
as used on G-R instruments . . .

Fluted, molded, black phenolic with brass insert for $\frac{3}{8}$ " or $\frac{1}{4}$ " shaft. Danger of stripping minimized by threading knob set-screws into insert rather than knob material . . . Available in a wide variety of sizes with or without pointers . . . Prices start at 70¢ per unit on purchase of five or more . . . quantity discounts apply.

Patch Cords

838-B Alligator Clips
10 for \$2.00

274-NO Universal Patch Cord, banana-plug tips attach to binding posts, alligator clips, adaptors for connection to variety of systems. \$3.25

874-R33 Patch Cord
similar to 274-NO but with 874 connector permanently attached to one end. \$5.00

874-R34 Patch Cord
has 274-NK Shielded Double Plug on one end and 874 connector on other. \$6.00

274-NT Shielded Double-Plug Adaptor \$0.90

874-QN6
874 Adaptor \$1.25

274-NL Patch Cord, 3-ft. shielded cable terminated in 274-NK Shielded Double Plugs. \$4.50

274-NP Patch Cord, double plugs molded on 3-ft. shielded cable. \$3.50

Power Cords

CAP-15 3-wire Power Cord, \$2.25
designed for use with instruments and outlets having grounding-type receptacles . . . 7-ft. cord rated at 7a, 125v.

CAP-35 2-wire Power Cord, \$1.75
high-quality, durable cord for rugged service . . . plug and receptacle molded in rubber directly to cable sheath . . . supplied with G-R a-c operated instruments . . . 7-ft. long; rated at 7a, 125v.

Prices are net F.O.B. West Concord, Massachusetts. Quantity discounts apply to small parts and Variacs in the United States and Canada. Source Inspection Surcharge: 1% or minimum of \$2.50 per shipment. Minimum billing \$10.00 except for repair parts and cash-with-order transactions.



Potentiometers

970 Series

Unique design makes possible moderately-priced high-quality resistance controls . . . 2 to 500,000 Ω ; 1-2-5 sequence . . . power ratings from 2 to 20 watts . . . linearity better than $\pm 0.3\%$ for larger units . . . glass-reinforced polyester shaft minimizes capacitance to ground . . . low electrical noise, high resolution, total enclosure with external phasing . . . from \$4.50 for 20 Ω , 2-watt unit to \$7.00 for 200 k Ω , 8-watt unit.

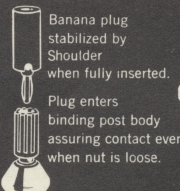
Type 938 Binding Posts

50¢ each in metal; 60¢ with metal top, red or black insulator base; 70¢ as shown in black or red insulation for quantities of 10-99 (large-quantity discounts available)

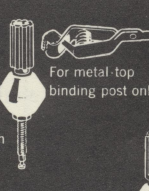
Attractive, well designed . . . feature polystyrene insulation for low dielectric constant and dissipation factor, minimum moisture effects . . . contoured hole in top provides firm grip without shearing wire from AWG #40 to #10; will accommodate telephone tips, spade terminals, alligator clips, etc . . . anti-rotation keyed bases for any panel thickness from 0 to $\frac{1}{16}$ ".



Standard telephone tip



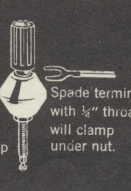
Banana plug stabilized by Shoulder when fully inserted. Plug enters binding post body assuring contact even when nut is loose.



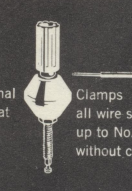
For metal-top binding post only



Slender alligator clip fits inside jacktop of all binding posts.



Spade terminal with $\frac{1}{8}$ " throat will clamp under nut.



Clamps all wire sizes up to No. 10 without cutting.

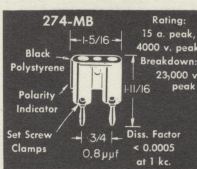
Plugs and Jacks

for temporary or semi-permanent set-ups . . . rated at 15 amps . . . plugs have nickel-plated brass studs and beryllium copper springs; jacks are nickel plated.



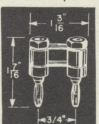
274-NK Shielded Double Plug, completely shielded, connects to 938 Binding Posts with standard $\frac{3}{4}$ -inch spacing. \$1.35

274-QBJ Adaptor
connects 938 jack-top binding posts spaced $\frac{3}{4}$ -inch to BNC connector. \$2.50

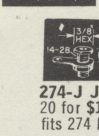


274-MB Insulated Double Plug, 5 units for \$3.25

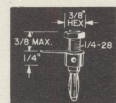
molded polystyrene double plug for rapid, convenient connection . . . fits 938 Binding Posts and 274 Jacks . . . stacking for multiple connections . . . low capacitance, low loss, complete insulation



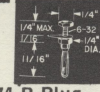
274-SB Short-Circuit Plug, 75¢ each, two 274-U brass plugs connected by heavy-duty links.



274-J Jack, 20 for \$1.60 fits 274 Plug.

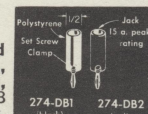


274-U Plug, 10 for \$2.00 has larger threaded stud to accept 274 Plug.

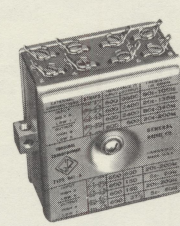


274-P Plug, 20 for \$2.60

274-DB Insulated Single Plug, 5 for \$2.50, half of 274-MB above, in red or black.



Transformers



941-A Toroidal Transformer, \$45

2 primary and 2 secondary semi-circumferential windings provide impedance matching ratios of 1:1, 4:1 or 16:1 in either direction . . . ultra-wide frequency range: 1-db drop from 20c to 200 kc for 150 and 600 Ω terminations.



578 Shielded Transformers, \$32 each

Individually-shielded windings for isolating bridge or measuring circuit from external circuit, generator or detector . . . 4:1 turns ratio . . . 3 models for use from 20c to 5 kc, 50c to 10 kc, 2 kc to 500 kc.



Ganged Models 970-Series Potentiometers

When ganged, the 970-Series Potentiometers retain their low-capacitance characteristics. Units are designed to be nested with phenolic spacing rings, stacked on a long shaft, and held together with thin metal clamping rings and tie rods. This assembly allows units to be set in any desired phase relationship.

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1.

2.

3.

4.

5.

NAME

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COMPANY

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COMPANY ADDRESS

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ZONE

STATE

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immediate need and
would like delivery
information.

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194-083-101

091-064-107

163-193-073

230-163-054

049-072-150

072-154-083

172-062-067

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000-136-168

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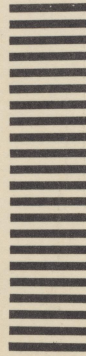
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